

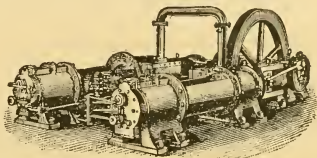
INDEX
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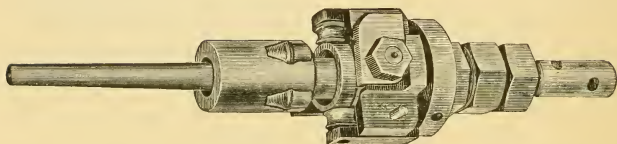
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*ENGINEERING; RAILROADS; SCIENCE;
MANUFACTURES AND TRADE.*

BY
FRANCIS E. GALLOUPE, M.E.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, S.B.; MEMBER AMERICAN
SOCIETY OF MECHANICAL ENGINEERS, ETC.

VOLUME II.

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FROM THE PREFACE TO THE FIRST VOLUME.

PROGRESS in the development of material resources, in recent years, has created a large and increasing volume of engineering literature in periodicals which contain valuable papers and information, much of which is too recent, or fragmentary in character, to be found in books, or elsewhere.

This work is designed to make accessible to engineers in all branches of the profession, to special investigators, librarians, editors and others, the more important papers and articles contained in leading American and English periodicals during the last five years. To keep the list from becoming unwieldy, it was decided to limit, besides the period covered, the number of periodicals, and with these restrictions the compiler has selected each reference given by personal examination of the articles in the files.

The index is by subjects, alphabetically arranged, and makes available information now practically buried in the mass of engineering literature, or only to be extracted by the aid of some one hundred and fifty indices, and the loss of much time.

BOSTON, *May*, 1888.

PREFACE.

THE purpose of this Index is to supply a reference list to the important works and matters relating to engineering and its allied interests, during the period covered. It is believed that no other index fills the field of this work, which shows at a glance the principal information published on any given subject in the leading periodicals during the past five years. The periodicals indexed having been selected from a list of over one hundred and sixty periodicals will, it is thought, sufficiently cover the field of practical engineering, as nearly all important works and matters are contained among these representative papers. Foreign papers are represented by translated articles reprinted in the periodicals indexed, and there are besides incidental references to numerous others.

Within the limits set, the aim has been, by a critical examination of each article throughout the files, to preserve references to all those of permanent technical value, or practical use.

BOSTON, *June*, 1893.

ABBREVIATIONS.

<i>addr.</i> address.	<i>discov.</i> discovery.
<i>agric.</i> agricultural.	<i>discuss.</i> discussion.
<i>Am.</i> American.	<i>distil.</i> distillation.
<i>amt.</i> amount.	<i>distrib.</i> distribution.
<i>anal.</i> analysis.	<i>dyn.</i> dynamometer.
<i>ap.</i> apparatus.	<i>econ.</i> economy, economical.
<i>aqued.</i> aqueduct.	<i>effic.</i> efficiency.
<i>atmos.</i> atmosphere.	<i>elec.</i> electric.
<i>aut.</i> automatic.	<i>eng.</i> engineering.
<i>bat.</i> battery.	<i>es.</i> estimate.
<i>Bess.</i> Bessemer.	<i>estab.</i> establishment.
<i>Brit.</i> British.	<i>evap.</i> evaporation.
<i>bull.</i> bulletin.	<i>exam.</i> examination.
<i>cal.</i> calculating, calculation.	<i>excav.</i> excavating, excavation.
<i>capac.</i> capacity.	<i>exhib.</i> exhibition.
<i>cath.</i> cathedral.	<i>exp.</i> expense.
<i>C. E.</i> civil engineer.	<i>expt.</i> experiment.
<i>Cens.</i> Census.	<i>frt.</i> freight.
<i>centrif.</i> centrifugal.	<i>galv.</i> galvanometer.
<i>chem.</i> chemistry.	<i>gov.</i> governor.
<i>condens.</i> condensing, condensation.	<i>h.</i> house.
<i>cor.</i> correspondence	<i>h. p.</i> horse power.
<i>corrug.</i> corrugated.	<i>hist.</i> history.
<i>Corp.</i> Corporation.	<i>hor.</i> horizontal.
<i>Co's.</i> Companies.	<i>hos.</i> hospital.
<i>cyl.</i> cylinder.	<i>ht.</i> height.
<i>dec.</i> decrease.	<i>hydr.</i> hydraulic.
<i>dept.</i> department.	<i>illum.</i> illuminating.
<i>des.</i> designer, design.	<i>imp.</i> improvement.
<i>desc.</i> description.	<i>inc.</i> increase.
<i>diam.</i> diameter.	<i>incand.</i> incandescent.
	<i>indus.</i> industry, industrial.

<i>ins.</i> insurance.	<i>R.</i> railroad.
<i>Inst.</i> Institute.	<i>recip.</i> reciprocating.
<i>inv.</i> inventor, invention.	<i>refrig.</i> refrigerating.
<i>locom.</i> locomotive.	<i>rep.</i> report.
<i>M. E.</i> mechanical engineer.	<i>resist.</i> resistance.
<i>mach.</i> machine, machinery.	<i>Ry.</i> railway.
<i>manuf.</i> manufacture.	<i>san.</i> sanitary.
<i>max.</i> maximum.	<i>sec.</i> second.
<i>min.</i> minute.	<i>Soc.</i> Society.
<i>mo.</i> motive.	<i>spec.</i> specification.
<i>mt.</i> mountain.	<i>sq.</i> square.
<i>munic.</i> municipal.	<i>st.</i> street.
<i>mut.</i> mutual.	<i>stat.</i> statistics.
<i>n.</i> note.	<i>str.</i> steamer.
<i>nav.</i> navigation.	<i>sup.</i> supplement.
<i>obs.</i> observations.	<i>teleg.</i> telegraph.
<i>pass.</i> passenger.	<i>teleph.</i> telephone.
<i>pat.</i> patent.	<i>temp.</i> temperature.
<i>pneu.</i> pneumatic.	<i>topog.</i> topographical.
<i>pop.</i> population.	<i>util.</i> utilization.
<i>por.</i> portrait.	<i>vac.</i> vacuum.
<i>pph.</i> pamphlet.	<i>vel.</i> velocity.
<i>pro.</i> proceedings.	<i>ventil.</i> ventilation.
<i>proc.</i> process.	<i>wrt.</i> wrought.
<i>prog.</i> progress.	<i>wt.</i> weight.
<i>pyrom.</i> pyrometer.	

NAMES OF PERIODICALS INDEXED,

WITH THEIR ABBREVIATIONS.

Cassier's Magazine. *Cassier's*
 Electrical Engineer, N. Y. *El Eng*
 Electrical Review, London. *El Rev Lond*
 Electrical Review, N. Y. *El Rev*
 Electrical World, N. Y. *El Wld*
 Engineer, The, London. *The Eng*
 Engineering, London. *Eng*
 Engineering Magazine, N. Y. *E Mag*
 Engineering and Mining Journal, N. Y. *E & Min*
 Engineering News, N. Y. *E News*
 Engineering Record, N. Y. *E Rec*
 Journal of the Franklin Institute, Phila. *F Inst*
 Power, N. Y. *Pwr*
 Proceedings of the Institution of Civil Engineers, London.
Inst C E
 Proceedings of the Institution of Mechanical Engineers, London.
Inst M E
 Proceedings of the Society of Arts, Boston. *Soc Arts Mass*
 Railroad and Engineering Journal, N. Y. *R & Eng*
 Railroad Gazette, N. Y. *R Gaz*
 Scientific American Supplement, N. Y. *Sc Am Sup*
 Street Railway Journal, N. Y. *St R J*
 Technology Quarterly, Boston. *Tech Q*
 Transactions American Institute of Mining Engineers, N. Y.
Am Min
 Transactions American Society of Civil Engineers, N. Y. *Am C E*
 Transactions American Society of Mechanical Engineers, N. Y.
Am M E

OTHER PERIODICALS INCIDENTALLY INDEXED IN PART.

American Engineer; Annales des Ponts; Building News, London; Century Magazine; Cosmopolitan Magazine; Forum; Le Genie Civil; Harper's Monthly; Industries; Iron Age; Journal of the Assoc. of Eng. Societies; The Locomotive; New England Magazine; Nineteenth Century; North American Review; Scribner's Magazine, etc.

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91-**88**, *Assoc Ings Liege* -**87**; Bobby *Sc Am Sup* Feb 2, (and silicon) production in elec. furnace (Cowles proc.), Dagger (full) * Nov 30-**89**

BRONZE and brass, as materials for propellers, Cowles *Am Min* v 18-**90**; do (full) *Sc Am Sup* Apr 12-**90**; bronzes, diagram *E News* * Feb 8-**90**

CARBURETTED iron, in. Keep *Eng* June 27-**90**

CAST iron, in, Keep *Am Min* v * 18-**90**; ed., Keep *Eng* Aug 31, 31-**88**; do *E & Min* * Aug 18-**88**, do. * Jan 25-**90**

CASTNER, sodium and aluminum procs. *E & Min* * Aug 18-**88 Eng**

COWLES proc. in England *El Wld* * Sep 29-**88**

DEVILLE-Castner proc. *Eng* Mar 22-**89**

DRAWING press, al. in, O. Smith *Am Min* v * 18, 18-**90**, do. *Eng* * Aug 29-**90**

ELECTRIC production, Brown *El Eng* * Apr 29-**91**, do *El Rev Lond* May 22, 29, June 26-**91**, do *El Rev* May 2-**91**, do (full) *El Wld* May 2, Crocker, discuss. 16-**91**; Stoke-on-Trent plant, England (full) *E & Min* * Sep 22-**88**; reactions, Bucherer, Jan 6, Farmer, 27-**91**; elec. smelting, Bobby *Sc Am Sup* * July 13-**89**; Farmer, July 25, reactions in Aug 1-**91**

FERRIC cake (for sizing paper) *Sc Am Sup* Nov 9-**89**, *Chem Tr J*

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GRABAU's method, ed. *Eng* Dec 20-**89**, abs. *Inst C E* v 101-**90**, *An Mines, Genie Civil* v 16-**89**, v 17 May -**90**

HEROULT proc., Dewey *Am Min* * v 18-**90**; *El Wld* * Nov 17-**88**, * *Industries*; *Eng* Oct 10-**90**; (full) *E & Min* Dec 1-**88**, and Cowles. Lowrey cor. Apr 27-**89**; Grabau's method, abs. *Inst C E* v 101-**90**, *Genie Civil* v 16-**89**, 17 May -**90**; *Sc Am Sup* * Dec 8-**88**

INSTRUMENTS of precision, Blake *Am Min* v 18-**90**

MANUFACTURE and industry, value, Dagger, ed. *El Rev Lond* Apr 8, July 15, Aug 19, Sep 2-**92**; Deville-Castner proc. *Eng* Mar 22, ed. * Aug 2-**89**, Lauffen-Venhause works * Feb 20-**91**; improvements in, n *E & Min* May 24, Grabau's method. Ichon Aug 16-**90**, *An Mines*; and uses, Hunt *E News* May 5, expt. with, Christie 19-**92**, do., Hunt (full) *F Inst* Apr -**92**; extraction on a commercial basis, Seymour, Roscoe (very full) *Sc Am Sup* Aug 24-**89**, Hall proc. * Feb 1, (pure) (full) * June

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7-90, value, Dagger Aug 15-91, Hunt (full) Apr 23, May 14 etc -92; *The Eng* * Nov 21-90

ORE, Nichols, n *Am Min* v 16-88

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SPECIFIC heat of, Richards *F Inst* Feb -92

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WROUGHT iron and steel castings, in, Keep *E & Min* Aug 30-90, *Am Min*

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Ampere, Andre M. n *Sc Am Sup* Dec 1-88

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- Anemometers** testing, Gieseler *E Rec* * July 13-89
- Angle**, the economical, Honey *Sc Am Sup* * Jan 17-91
- Angle-iron** bevelling machine *The Eng* * June 6-90; tests, Loweth *E Rec* Feb 1-90, *J Assoc E Socs*
- PRISMS, Gieseler *E News* * May 12-88
- Animals**, animal arithmetic, Royer *Sc Am Sup* Feb 2-89, *Pop Sci*; as a motor-machine, Thurston *Cassier's* Feb -92; how the world appears to, *Sc Am Sup* Jan 12-89; language of, Duthiers Feb 13-92, *Pop Sci*
- Annealing** iron or steel, non-oxidizing proc., H. P. Jones *E News* * Jan 2-92
- Antagonism**, Grove *Sc Am Sup* June 9-88
- Antartic** exploration, Griffiths (full) *Sc Am Sup* Jan 10-91
- Anthony**, W. A., por. *El Wld* * Feb 1-90
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- Apatite** mining in Canada *Sc Am Sup* Dec 8-88, *E & Min*
- Arañas** Pass, Texas, imp. *E News* * Aug 30, Haupt, cor. * Sep 13-90
- Arc**, length of, method of determining, Hartl, abs. *Inst C E* * v 107-92, *Zeit Deut Ing* -91
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- EQUILIBRIUM, curves, Suplee *Am M E* * v 11-90
- GOUR Noir viaduct, Vezere river, Uzerche, France, inset *E News* * Aug 18-92

Arches, MT. Vernon viaduct *E News* * Sep 1-**92**

SEGMENTAL and two-nosed catenaries, Alexander *Eng* * July 12-**89**

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DESIGN, elements of, Statham (full) *E Rec* * Jan 14-**88**, do. (full) *Sc Am Sup* * Feb 18, 25 * May 19, 26 * June 9, 16-**88**; logical basis of, Walker *Tech Q* May -**90**; engineering, Freitag *Sc Am Sup* * Aug 22-**91**

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APARTMENT house, Yosemite, N. Y., entrance *E Rec* * June 27-**91**

CATHEDRAL, Albi, France, inset *E Rec* * Apr 18-**91**; builders of the cathedrals, Snow *NE Mag* * Dec -**92**; Siena cath., Pisano *Sc Am Sup* * Oct 19-**89**

CHATEAU Epreville-Martainville, France, inset *E Rec* * Sep 26; (Lot) France, inset * July 25-**91**; Josselin, Brittany, inset * Jan 23-**92**

CHICAGO, Ill., Herald building, inset *E Rec* * Nov 14-**91**; sketches in *Sc Am Sup* * Dec 3-**92**

Architecture, CHURCH at Chateaufneuf (Charente), France, inset *E Rec* * Sep 19; of St. Paul, Dax (Landes), France * June 6-91

CITY Hall, the, in Am., Ferree, insets *E Mag* * Nov -92; Bremen, Germany, inset *E Rec* * Dec 12-91; Cologne, Ger., entrance, inset * Apr 2; Hotel de Ville, Poitiers, France, inset * Dec 10-92

CLUB house, Century, N. Y., doorway, inset *E Rec* * Dec 19-91; Montauk, Brooklyn, inset * Apr 9; Catholic, N. Y., inset * Dec 17-92

COLUMBIAN exhib., U. S., Chicago, Van Brunt *Century* * May—* Aug -92

COUNTRY houses, Cambridge. etc., inset *E Rec* * Jan 17-91; Cohasset, Mass., interior, inset * Apr 23-92; English, inset * Aug 29-91; Arthur Little's, Boston, inset * Feb 20; Geo. Macculloch, Morristown, N. J., inset * Mar 26; Marblehead Neck, interior, inset * Jan 16-92; Swampscott, Mass., inset * Aug 15, Elihu Thomson's do., inset * May 9-91

COURT house, Beauvois, France, inset *E Rec* * Nov 19-92

FRANKFORT-on-Main, Ger., Union R. pass. station, insets *E Rec* * Sep 5-26 * Dec 5-91. See also BUILDING

GALLERY Victor Emanuel, Milan, inset *E Rec* * July 30-92

LIBRARY, Tilden Trust, N. Y., proposed, Bigelow *Scrib.* * Sep -92

MEAT market, old, Haarlem, Holland, inset *E Rec* * Feb 14-91

MOBBERLY Hall, Cheshire, England, inset *E Rec* * Nov 26-92

MUSEUM building and arrangement, Ferree *E Mag* * Nov -91; Amsterdam, Holland, inset *E Rec* * Feb 28; Hague, do., inset * May 23-91

MUSIC Hall, N. Y., main entrance, inset *E Rec* * Feb 13-92

PALACE of Justice, Hague, Hol., inset *E Rec* * Mar 7-91

RECEIVING vault, Woodlawn cem., N. Y., inset *E Rec* * Feb 27-92

RESTAURANT, Frankfort Palm garden, inset *E Rec* * Oct 31-91

ROMERBURG, Germany, inset *E Rec* * Dec 26-91

SWISS Vecchia inn. Maloja Pass, inset *E Rec* * Apr 16-92

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Argall, Philip, por. *E & Min* * Dec 5-91

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- Arkansas mines**, Branner, *E & Min* Oct 20-**88**
- Armada** (Spanish), defeat in 1588 *Sc Am Sup* * Aug 25-**88**
- Armor**, cellulose *E News* Dec 1-**88**, steel, tests at Annapolis. Sep 20, 27 * Oct 4-**90**. See also GUNNERY and armor
- Arms and armor of ancient Japan**, Baba *Soc Arts Mass.* -**88**
- Army**, Austro-Hungarian, Kuhn *Harper's M* * June; Italian, Goiran * Aug -**92**; European armies, Dodge *Forum* July -**92**; of Kukuianaland, Michaelis *Sc Am Sup* Oct 26-**89**, *F Inst*
- Arrol**, William, por. *Eng* * Feb 28-**90**
- Arsenal**, Woolwich *The Eng* * Oct 2-**91**
- Arsenic** determination, Canby *Am M E* v 17-**89**, *Birm* May -**88**; *Locom* June -**92**
- Art**, fine, composition and selection of a subject, Ellis *Sc Am Sup* * June 1-**89**; use of cloisonne for decoration, Heaton (full) May 9; pictures, durability painted with oils and varnishes. Laurie June 20; Miller, Aug 22; decorative treatment of natural foliage, Stannis (full) * Nov 21, 28 * Dec 5, 19, 26-**91**
- Artesian wells**. See WELLS, artesian
- Artificial limbs**, Mark's *F Inst* * May -**89**
- Artillery** service in the rebellion, Tidball *J Mil Ser Inst Mag* May -**92**. See also GUNNERY and armor; GUNS
- Arts and manufactures**, prog. rev. *F Inst* Feb -**88**. See also SOCIETY of Arts, London
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- MERCURY *Sc Am Sup* * Apr 26-90
- METEORITES, meteors *Locom* July -90; August *Sc Am Sup* Oct 13-88; notes, Lockyer (full) * Feb 2; and what they teach, Hensoldt, Nov 16, 23-89; Wash. Co., Kan. Aug 23-90; meteoric finds, Foote, Feb 6-92; *Nature*; *Science*. See also ASTRONOMY, comets.
- MILKY way, Gore *Littell's* Apr 30-92
- NEPTUNE, discovery (great discoveries) *Locom* Dec -89
- OBSERVATORIES, Levander *Sc Am Sup* Aug 29, (full) Sep 5-91; Halsted ob. spectroscope *Eng* * July 22-92; Pekin ob. *Sc Am Sup* * Jan 12-89; Warner ob. *Eng* * Jan 27-88. See also ASTRON., Lick-Sayre observs.
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- SPACE, constitution of, Hirn, bk. review *Eng* Nov 8-89, do. *Sc Am Sup* Jan 11, do. De V. Wood, Apr 5; the grants of starry space, Jan 25-90
- SOLAR spectrum, limit of, Hartley *Sc Am Sup* May 4-89, *Nature*
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- URANIA Institute, Berlin (Lick observ.), Holden *E Mag* * Mar -92; planet Uranus, Gregory *Sc Am Sup* Aug 24-89
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- Balloons**, how to cross Africa in *Rev of Revs* Sep -92; construction, Myers *Sc Am Sup* Nov 30-89, history of aeronautics, Stevens (full) * Feb 22, * Mar 1-90. See also AIR navigation
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- Band-saw mill**, the Am., Suplee *Cas* * Feb -92; saws for heavy timber, ed. *Eng* Aug 30-89
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- Barnes**, F. W., por. *E & Min* Jan 16-92
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- Barrel machinery**, universal *The Eng* Sep 20-89
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- Barry**, William H. *Inst C E* v 100 -90
- Bartol**, B. H. *Am M E* -88, *F Inst* June -88
- Barytes** and umber mines and refining mills, Cleator Iron Ore Co., Caldbeck Fells, Addison, inset *Inst C E* * v 102 -90
- Bassett**, Alexander *Inst C E* v 92 -88
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- Bates**, Henry W., por. *Pop Sci* * Nov -92
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- Battle-ships**. See NAVIES, names of countries
- Bayly**, George H. *Inst C E* v 93 -88, 98 -89
- Bayonne**, Port of *Eng* * Dec 6-89
- Bazalgette**, Joseph W. *Eng* Mar 20-91, (full) *Inst C E* v 105 -91, *The Eng* Mar 20-91
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- Beams and girders**, the continuous girder as a tipper, Lindenberg *Am C E* * v 26 -92; theoret. strength, cor. *Eng* July 1-92. *E News* cross-sections, unsymmetrical, Johnson * Feb 4-88, loading long girders on cars, movable frame * Jan 9-92
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- Boulanger**, General, por. *Sc Am Sup* * July 7-88
- Bourdeaux**, John *Inst C E* v 104 -91
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- Box** nailing machine, Hodge's *Eng* * Mar 29, 29-89, *The Eng* *
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- Brakes**, Carter *El Rev Lond* * July 8-92; Prony brake, horse
power characteristics, Crane *El Wld* * Mar 15, 22-90, do.
Pwr Feb, June * Nov * Dec -88. See also ENGINES, brakes;
RAILROADS, brakes

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Branner, John C., por. *E & Min* * Dec 12-91

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Apple river, fall *E News* Mar 31; Arcole Apr 14-88; wreck

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do. *The Eng* * Dec 4, 11-91, Ende * Feb 19-92. See also

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ALGOAS Ry., Brazil *E News* * July 25-91

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engineer on, Le Rond *R & Eng* Sep -89, *An Ponts*

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ARAUCO R and Bio-Bio, Manby *Inst C E* * v 108-92

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cor. * Dec 14, joints, pressures, Trautwine * 21-88

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Pa. * July 20-89; Conemaugh, Penn. Cen. R. * Mar 29; stone,

Elyria, O. * June 21; ribbed steel, Rock Lane, New Haven,

Ct., Hill * Aug 16-90; stone, Falls of Schuylkill, Phil. &

Reading R. * Jan. 24; stone, Elkader, Ia., Turkey river * Apr

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with lead joints at key * Oct 24-91; New Brunswick, N. J.,

Albany st. masonry arch * Apr 16; Gour Noir viaduct, Vegere

river, Uzerche, France, inset (full) * Aug 18; Mt. Vernon via-

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steel * May 10-90; stone park, Prov. * July 23-92; skew

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struction with hinged arches, Riviere, abs. v 107-92; *An*

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Grossart *Lehigh Eng J* Apr -89; Wheeling, W. Va., 158-ft.

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ASSAM suspen., Doyong river *The Eng* * Aug 15-90

AUSTRIA iron, renewal, Huss, abs. *Inst C E* v 98-89, * *Zeit ost*

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 BEARINGS, fixed and expan., Sinot-Pichin R. *The Eng* Oct 12-**88**
 BEAVER river plate girder, Pitts. & L. Erie R., inset *E News* *
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 BERLIN, the Moltke, Pinkenburg, iron tilt do., abs. *Inst C E v 92*
 -**88**, *Deut Bauz* -**87**
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Eng May 7-**90**
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 BROOKLINE, Mass., plate girder highway, inset *E News* * Sep 19
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 capac., Wellington * Apr 5-**90**, problem * Jan 17-**91**
E News growth of traffic * Feb 11, enlarging capac., report
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C E * v 109 -92
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 * Oct 27-92; construction, iron and steel, Fidler, bk., Griffin &
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 CAPUTH ferry, Tay river *Eng* * Sep 13-89
 CASCADE, Sears, cor. *E News* Sep 1, Oct 6-88
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 CHATTANOOGA, Tenn., Walnut st., inset *E News* * May 16-91
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 CHESAPEAKE & Ohio, Ohio river, Burr, inset *Eng* * Dec 5-90
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 draw-br., Madison st., inset *R Gaz* * Mar 11-92
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- Bridges**, CHICAGO & No. Western R. thin floor plate girder
E News * Apr 9-92
- CHICAGO & Western Indiana Belt R., 105-ft. double track through
 span *R Gaz* * Oct 30-91
- CHITRAVATI river, Madras R., India, Stoney *E Rec* * Apr 30 *
 Aug 6, 13 * Nov 12-92, and discuss., insets *Inst C E* * v 103,
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- CINCINNATI & Covington elevated R. Transfer & Br. Co., river
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- CINCINNATI & Newport *E Rec* Sep 10, Nov 5 * 19 * Dec 31 etc.
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- CLARENCE, Taff river, Cardiff, So. Wales, inset *Eng* * Jan 30 *
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- CLEVELAND central viaduct *E News* * Dec 22-88
- CLYDE river, proposed *R & Eng* * Mar -89, * *Industries*
- COFFER-dam or caisson without timber or iron in its construction,
 R. Harris, discuss., insets *Am C E* * v 24 -91, *R & Eng* May
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- COLORADO river cantilever, Cal. & Ariz. R. *E News* * Feb 23
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- COLUMBIAN exhib. steel canal *E News* * Apr 21-92
- COLUMNS, z-iron, expts., Strobel *Am C E*, *R Gaz* July 13-88
- COMPRESSION members, Bess. steel, expts., Dagron, discuss., in-
 sets *Am C E* * v 20 -89
- CONEMAUGH arch, Penn. Cen. R. *E News* * Mar 29-90
- COTEAU, St. Lawrence river, Quebec, Can. Atlan. R. *E News*
 * Apr 12-90, machinery for swing span, inset * May 30, 30
 -91, construction, Mountain, abs. *Inst C E* v 109 -92, *Can*
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- CRIB, Salisbury & Haney R., N. B. *E News* * June 7-90
- CRUEIZE viaduct, Marjevois, So. France R., n *R & Eng* * Mar
 -91, * *Genie Civil*, *The Eng* * June 5-91
- CUMBERLAND, Md., Balt. st. *E News* * July 21-92
- DALMARNOCK, Glasgow, inset *Eng* * Mar 28-90
- DELAWARE, Lack. & W., White's plate girder *R & Eng* * July
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- DRAW-BRIDGES, swing, turning by elec. power *El Rev* *
 Apr 20-89; hydr. machinery, Fidler *Eng* Feb 19-92; end-
 adjusting gear for, Turner *E News* * Apr 16. vertical lift,
 method of operating * June 20-92; lock, Penn. R. *R Gaz* *

Bridges, DRAW-BRIDGES

July 27-**88**; protection, Boston, Rev. B. & L. R., Hammond, Oct 14-**92**

ARTHUR Kill, Staten Is. Rap. Tran. Co. *R Gaz* * June 22-**88**, approaches * July 26-**89**

BERLIN, Moltke iron tilt, Pinkenburg, abs. *Inst C E* v 92 -**88**

BRIDGEPORT, Ct., elec. operation *El Wld* * Apr 20-**89**

CASTLETOWN swing, Wawn, inset *Inst C E* * v 92 -**88**

CHICAGO river folding, *Eng* * July 24-**91**; swing by electricity *R Gaz* * Aug 21-**91**; Madison st., inset * Mar 11-**92**; Weed st., folding floor *E News* * May 23-**91**

COTEAU, St. Lawrence river, Quebec, Can. Atlan. R., machinery for swing span, inset *E News* * May 30, 30-**91**. See also BRIDGES, Coteau

DEE river swing, Manchester, Shef. & Lincoln R. *The Eng* * Nov 22, 29-**89**

DISMAL swamp canal, Norfolk & W. R., inset *E News* * Nov 3-**92**

DRYPOOL swing, Hull *The Eng* * Jan 3-**90**

DULUTH, Minn., ship canal, designs *E News* * Oct 27-**92**; lift, proposed, inset *R Gaz* * Apr 8-**92**

FLORENCE R., Tenn. river *E Rec* * Feb 28-**91**

FRASER river Howe truss, Can. Pac. R., Cambie *R Gaz* * Nov 25-**92**

GLAMORGANSHIRE canal swing, Cardiff *The Eng* * Aug 7-**91**

HACKENSACK, Erie R. *R Gaz* * July 20-**88**

HARLEM river lift, *R Gaz* June 10, temporary pile supports, Triest * Aug 19-**92**

KIDDERPORE docks swing *The Eng* * Apr 22-**92**

MANCHESTER ship canal swing *Eng* June 6-**90**

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NEW London, Ct., Thames river *E News* * Aug 16-**90**

OAKLAND, Cal., accident *E News* * June 7-**90**

PAUMUNKEY river, erection *E Rec* * Feb 14-**91**

PETALUMA *E News* * Oct 13-**88**

POLLET swing, Dieppe, France *R Gaz* * Aug 26 * Sep 9-**92**, inset (full) *The Eng* * July 29 * Aug 5-19 * Sep 9-**92**

TARENTO, Italy *E News* * Sep 13-**90**

THAMES river, New London, Ct., pivot pier *R Gaz* * Nov 7-**90**

TIENTSIN, China R. *The Eng* Feb 3, 24-**88**

WINONA, Minn., swing span, inset *E News* * Oct 17-**91**

Bridges, DUFFERIN, Ganges river, Benares, Oude & Roh. R., India *Eng* * Feb 17, 17-**88**, Walton, Mar 7-**90**; construction, Walton *E Rec* Aug 22 * Dec 19-**91**, Jan 9, 30-**92**; Walton. discuss., insets *Inst C E* * v 101 -**90**, do. *The Eng* Mar 14-**90**

DULUTH, Minn., 6th ave. viaduct *E Rec* * Feb 20, 27, harbor entrance, proposed May 14-**92**. See also BRIDGES, draw-bridges, Duluth

DU VIAUR viaduct, proposed, inset *E News* * Nov 30, 30-**89**

EARN viaduct. Caled. R., Scot.. renewal, inset *Eng* * Sep 16-**92**

ENGLISH Channel, proposed, Schneider *Eng* Sep 27-**89**, ed., Aug 7-**91**, * Sep 23-**92**; Talansier *E Rec* * Nov 2, 16-**89**, * *Genie Civil*; *F Inst* Nov -**89**; *R & Eng* * Nov -**89**; *R Gaz* Oct 11-**89**; Fleury *Rev des Deux Mondes* Aug 15-**92**; Schneider, Hersent, prelim. designs (very full) *Sc Am Sup* * Nov 2, 9, 16 * Dec 21, 28-**89** * Jan 25-**90**, do. *The Eng* * Sep 27 * Oct 4, 11-**89**

ENZ river, Hofen *Eng* * May 6-**92**

FLOATING, Portsmouth & Gosport, Harris *Eng* * Oct 7 *E Rec* Oct 15, *Sc Am Sup* * Nov 19, *The Eng* * Sep 23-**92**, *Inst M E*

FLOORS, wrt. iron double track floor-beam, Boller, discuss., insets *Am C E* * v 18 -**88**; do. *Sc Am Sup* * June 2-**88**; do. *The Eng* Apr 27-**88**; floor-beams and pine stringers for, Bates, dis., insets *Am C E* * v 23 -**90**; Hobson's flooring *Eng* * Nov 29-**89**; iron and ballast floor *E News* * Mar 23-**89** * Oct 27-**92**; solid R. *R Gaz* June 27, ed. Oct 31-**90**, shallow * Sep 11 -**91**. See also BRIDGES, railroad, floors

FOOT-bridges, Oker river, Brunswick, inset *Eng* * Aug 17, inset * Sep 7-**88**; Ouse river, Bedford *Sc Am Sup* * Sep 8-**88**; Kernot, cor. *The Eng* Aug 16 * Nov 15-**89**

FORTH, *Am C E* obs. on, Emery, insets * v 22 -**90**

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E Mag greatest in world, Clarke * Apr -**91**

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E News * Mar 10, Cooper * Sept 22-**88**, * Feb 9, determination of wind pressure by model, n Mar 16-**89**, inset * Jan 25, 25, testing, Feb 15, notes. Mar 15, final inspection report. Mar 29-**90**, criticisms, Cooper, cor. Lindenthal, Dec 5 -**91**

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E Rec Baker * Oct 12-**89**; construction * Sep 6-**90** * Jan 10-**91**

Inst C E hydr. appliances at works, Moir, inset * v 91 -**88**, Austrian prototype of Köstlin, abs. n v 92; Queen's ferry, Nott *Locom* June -**90**

R & Eng description * Feb -**90**

R Gaz Biggart * May 18, erection * July 13, discuss. on bridge steel, Cooper, Sept 14-**88**, *Iron & Steel Inst Brit.* * Nov 15-**89**, *Industries* Oct 11-**89**, wind pressure obs. *R Gaz* Apr 18-**90**

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The Eng Feb 3, Aug 24. Oct 19, 19, Nov 9, 9-**88**, * Jan 11, July 26 * Aug 2, 23, 23, inset * Dec 13-**89**, * Feb 28, opening, Mar 7, Ry 14-**90**

FORT Madison, Miss. river, inset *Eng* * July 19-**89**, *Sc Am Sup* * Aug 31-**89**

FORT Smith R., Ark., piers *E Rec* * Oct 22-**92**

FOUNDATIONS, design, H. Lewis *E News* Oct 17-**91**; repairing, Wash. aqueduct, D. Hunt *E Rec* * Dec 27-**90**; piling vs. mud-sills, Cantine *R Gaz* Sep 9-**92**. See also FOUNDATIONS

GAGNIERES viaduct *R & Eng* * May -**89**

GARABIT viaduct *E Rec* * Mar 7-**91**; Eiffel, abs. *Inst C E* v 95 -**89**, *Compt r* July -**88**

GIRDER, fundamental types of metallic and the cantilever system, Gaudard, abs. *Inst C E* v 106 -**91**, *An Ponts* Mar -**91**; girder tests, Austrian, mild steel *R Gaz* * Nov 27-**91**; girder flanges, lateral stability of *The Eng* * May 29-**91**. See also BEAMS and girders

GLAMORGANSHIRE canal swing, Cardiff *The Eng* * Aug 7-**91**

GLASGOW harbor high level, proposed *Eng* Jan 11-**89**; Glasgow Cen. R., inset * Aug 19-**92**. See also BRIDGES, highway, Glasgow; Railroads, underground, Glasgow Cen.

GLENURY viaduct timber arch *E Rec* * Nov 12-**92**, *Eng*

GREENOCK & Gourock R., inset *Eng* * Feb 22-**89**

GROUSE valley R. *E Rec* * Jan 19-**89**

GOUR Noir viaduct, Vegere river, Uzerche, France, inset (full) *E News* * Aug 18-**92**

HACKENSACK draw-bridge, Erie R. *R Gaz* * July 20-**88**

HARLEM river, N. Y. *E News* * May 26-**92**; *E Rec* * Jan 21, erection * July 7-28 * Aug 11, Sep 1-**88**; lift *R Gaz* June 10,

Bridges, HARLEM

temporary draw-br. pile supports, Triest * Aug 19-92. See also BRIDGES, draw-bridges, Manhattan

HAWARDEN, Dee river, Fox *E News* * Sep 15-92, inset *Inst C E* * v 108 -92

HAWKESBURY R., New So. Wales, Burge *Eng* Mar 7-90; motions, observed in, Ewald, cor. * Feb 6-91, do. *E News* * Mar 14-91; Jan 5, testing, July 20-89; erection *E Rec* * May 30 * June 6-91; Burge, insets *Inst C E* * v 101 -90; placing the center span *R Gaz* * Aug 10-88; *Sc Am Sup* * Aug 11-88; *The Eng* Sep 7-88, June 14, Sep 13-89, Burge Mar 7-90

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E Rec viaducts across R. tracks, Gayler, Sep 19-91, do. *J Assoc Eng Socs*, iron and steel, Waddell, discuss. Nov -88, abs. *Inst C E* v 95 -89; floors of st., Gayler, abs. v 93-88, *J Assoc Eng Socs* -88; Kelvin river road, Glasgow *R & Eng* * Nov -91; Niemen river, Olita, Russia * Dec -92; 158th st., over N. Y. Cen. R. *R Gaz* * Nov 9-88; Nova Scotia * May 3-89; over R. tracks, experience with, Gayler. Aug 21 -91; brick, Persia *Sc Am Sup* * Dec 31-92

HOOGHLEY river Jubilee R., India, Leslie *Eng* Jan 27-88, erection *E Rec* * Oct 4, 25-90, do. discuss., inset (full) *Inst C E* * v 92-88, do. *The Eng* Feb 10-88

HOWE truss, timber, Willamette river, Albany, Or. *Eng* * Jan 6-88; timber structures, western Am. 180 and 250-ft. span, inset * Oct 7-92; determination of length of strut, D'Armit, cor. *E News* * Nov 16, 23, strut prob. Dec 14-89; Or. Pac. R., strain sheets, inset * Apr 26, 26; 50 and 68-ft. spans, Can. Pac. R. * May 24-90; R., Jameson *R & Eng* * Mar * May * June * Aug * Sep * Oct * Dec -90 * Jan * Feb -91; Willamette

Bridges, Howe

river, timber, Albany, Or. *R Gaz* * Apr 19-**89**, *Sc Am Sup* * Mar 17-**88**, *Eng*

HUDSON river, first design, Pope's flying lever, 1811 *R & Eng* * May -**88**; tunnel. ed. *E News* May 31-**90**

INDIA, bridging alluvial Punjaub rivers. ed. *Eng* Jan 31, notes, Feb 14, Mar 28-**90**; Chittravati, discuss., insets (full) *Inst C E* * v 103, 104 -**91**. See also BRIDGES, Chittravati—Hooghley river—Sukkur

IRON, wts. of, formulas, Beatty *Lehigh Eng J* June -**88**

JERSEY City, Harsumn's Cove transfer, Benset, insets *Am C E* * v 19 -**88**

KANAWHA river *E Rec* * Aug 17, 31 * Sep 14, 28 * Oct 5, 19, 26 -**89**

KENNEWICK, No. Pac. R. *R Gaz* * Nov 8-**89**

KENTUCKY river, or Tyrone cantilever, inset *E News* * Apr 5-**90**; Irvine, Ky., erecting * May 26 -**92**

KENTUCKY & Indiana, Louisville *Eng* * Jan 27-**88**; Moulton, abs. *Inst C E* v 92 -**88**, *Am C E* Sep -**87**

KINGPOST truss, wrt. iron shoe for, Cin. N. Or. & Tex. R. *E News* * Apr 6-**89**

KINZUA viaduct, J. Clarke *Am M E* * v 11-**90**; 1882, T. Clarke *E News* July 5, n, Aug 30-**90**

LAGAN, Belfast *The Eng* * Aug 22, 29, 29-**90**

LANDSLOWNE, at Sukkur, Indus river. See BRIDGES, Sukkur

LOA viaduct, Antofagasta R., Bolivia 336 ft., highest in world *E News* * May 18-**89**, *R & Eng* * June -**89**, *Sc Am Sup* * Mar 15-**90**, *The Eng* * Apr 19, 19, inset * 26-**89**

LONDON, England, Blackfriars, Thames river, Lond. Chat. & Dover R., Cruttwell, discuss., inset *Inst C E* * v 101 -**90**, *The Eng* Mar 21-**90**

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TOWER. See BRIDGES, Tower, London

LONG span, discussion of, Lindenthal *E News* * Mar 3, 10, 24; very long span, proposed design, Warren * June 30-**88**; and North river, N. Y., Lindenthal, Nov 9, 16, 23-**89**; table *R Gaz* May 2-**90**

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- Bridges, MALLECO** viaduct, Chili, Mamy. abs., inset *Inst C E* * v 104-91 *Genie Civil* * v 18-91
- MANARVATER timber viaduct, New Zealand *E Rec* * Jan 4-90
- MANHATTAN, Harlem river, N. Y. *Eng* * May 4-88, *E News* * Feb 4, Sep 8-88. See also BRIDGES, Wash.
- MARBLE Creek viaduct *E Rec* * Apr 18-91
- MARENT Gulch high viaduct. No. Pac. R. *R Gaz* * Apr 26-89
- MARGHERITA, Rome *R & Eng* * June -92, *Industries*; Turin. Po river, abs. *Inst C E* v 92-88, *Giornale Civ* -87
- MASONRY, with semi-free joints, Cunningham *Eng* * May 6. *Sc Am Sup* * June 25-92, *An Ponts*
- MATTABESSETT river, E. Berlin, Ct., inset *E News* * Apr 2-92
- MAUCH Chunk suspension, Hildebrand *E News* * Feb 25, Mar 10-88
- MEMPHIS R., Miss. river, Tenn. *E News* * May 12, inset * June 16, inset * Sep 15-92; erection *E Rec* June 20 * July 25 * Oct 17-31 * Nov 7-91 * May 14-92; and ed. *R Gaz* * Feb 21-90, June 26-91 * May 13-92; *The Eng* Aug 3-88
- MICHIGAN Cen. standard, with 3 inside guard rails *R Gaz* * Nov 1-89
- MISSOURI Pacific, inset *E News* Feb 14-91
- MOLDAU viaduct, at Cervena *E News* * Apr 19-90; Huss, abs., *Inst C E* v 98-89 * *Woch ost Ing* -89
- MONTREAL, proposed *E News* May 31-90
- MORAND, Rhone river, Lyons *The Eng* * Oct 16, 23, 30-91
- NEEDLES, cantilever, Col. river, Cal., Atlan. & Pac. R., inset *R Gaz* * Apr 25-90
- NEWARK Dyke, Grt. Northern R. *The Eng* * Mar 7, 21-90
- NEW Brunswick, N.J., Albany st. masonry arch *E News* * Apr 16-92
- NEW London, Ct., Thames river. See BRIDGES, Thames river
- NEW Orleans, Miss. river, projects *R Gaz* * May 16 * July 11-90
- NEWPORT viaduct, Isle of Wight, inset *Eng* * Jan 25-89
- NEW York Cen. double track with solid plate floor *R Gaz* * May 17-89
- New York and N. J., Clark report, inset *R Gaz* * Sep 23 *Sc Am Sup* Oct 22-92. See also BRIDGES, Harlem, Manhattan-North river, railroad, Washington, etc.
- NEW York, Prov. & Boston ballast floors *E News* * Mar 1-90
- NEW York Rapid Transit R. viaduct, proposed *E News* * Oct 31-91

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NIAGARA suspen., towers reconstruction, Buck, *Am C E* v 17 -**87**, abs. *Inst C E* v 93 -**88**

NORFOLK & Carolina transfer, inset *E News* * Jan 30-**92**

NORFOLK & Western standard plans *E News* * June 23, 28-**88**

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OHIO Connecting R., Pitts, Pa., floating 523-ft spans into place, inset *E News* * Sep 20, false works * 27-**90**, do. (full) *E Rec* * Sep 13, erection * Dec 13-27-**90** * Jan 3-**91**, Strobel, abs. *Inst C E* v 103 -**91**; inset *R Gaz* * June 20, Aug 22, inset * Sep 12-**90**

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OMAHA, erection *E Rec* * Mar 9, 16-**89**; suit *R Gaz* July 31-**91**

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PADERNO viaduct, Adda river, Sacheri, abs. *Inst C E* v 98 -**89** * *L'Ingeg Civile* -**89**, *R Gaz* * Sep 14-**88**

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PECOS river, Southern Pac. R., Tex. *E News* * Feb 6-**92**

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PHILADELPHIA, Market st. cantilever, Amweg *E News* Apr 7-**88**

PIERS, Red river concrete, Purdon *E News* * June 2-**88**; French masonry and detail * Sep 5-**91**; Stettin, Ger., masonry removal * July 14; screw piles for * Aug 4-**92**; moments, graph.

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- PILE and trestle, Robinson *E News* Apr 7-88. See also BRIDGES, railroad; PILING; TRESTLES
- PINS, fibre strain in, J. Johnson *E News* * Jan 28, Du Bois, cor. Mar 10, strains in, Fowler, cor. * 24; and eye-bars, proportions, Stowell, Mar 31-88
- Po river, at Casalmaggiore, Parma-Brescia R., erection *E Rec* * May 5-26-88, abs. *Inst C E* v 95 -89, *L'Inge Civil* -88
- POLLET swing. See BRIDGES, draw-bridges
- PONTOON, Indian boat, Fenner *R & Eng* * Sep -88
- PONY lattice. N.Y., West Shore & B. R. *R Gaz* * Sep 21-88
- PORTABLE. Brochocki's *Eng* * Apr 5; Paris exhib. * Aug 2-89; *E News* May 26 * Sep 1-92; French iron. Talansier *E Rec* * Jan 12-89 * *Genie Civil*; metallic, for quick erection, Pichault, abs. *Inst C E* v 91 -88, *Assoc Ings Liege* -87
- PORTAL bracing, anal. of stresses. Cain *E News* July 13-89
- PORTSMOUTH & Gosport floating, Harris *Eng* * Oct 7. *E Rec* Oct 15, *Sc Am Sup* * Nov 19, *The Eng* * Sep 23-92, *Inst M E*
- POUGHKEEPSIE, cantilever, Hudson river, construction, O'Rourke, insets (full) *Am C E* * v 18 -88, inset *E & Min* Feb 2-89, *E News* Jan 7-88 * Feb 16-89, abs. *Inst C E* v 96 -89, T. Clarke *Sc Am Sup* * May 19-88, *The Eng* Sep 21 -88
- PROVIDENCE, R.I., Point st., guard gates. Bullock, insets *Am C E* * v 20-89, *E Rec* * Nov 28-91
- QUERETARO aqueduct, Mexico *E News* * June 2-88
- QUINDARO, caissons and cribs, inset *E News* * Apr 4-91
- RADIAL truss, F. Smith, cor. *E News* * Apr 11-91
- RAILROAD, wts. of, Du Bois, inset, new form of strut. Strobel *Am C E* * v 18-88; Am., Cooper, discuss., insets (very full) * v 21, 21 -89; R. bed for bridge structures. Woolson *Am M E* * v 9 -88; bridging canons lengthwise. Hinckley, inset * v 26-92; Burge, Walton, Cruthwell *Eng* Mar 7-90; Am. viaducts. Greiner * Aug 14-91; Glenury viaduct renewing in Scot., Caled. R., inset * Sep 2, Earn viaduct * 16-92; Am., Cooper. (full) *E & Min* * Oct 5-26 * Nov 2, 9. 30-89, do. *E News* * July 6-89; Am., origin and evolution, Greiner * June 6-91; use of steel for, symposium. Mar 26. Apr 2. Aug 25-92; wrt.

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STRAINS, produced by loaded cars of 90,000 lbs. capacity, Blakely cor. and ed. *E News* May 10-**90**. See also BRIDGES, strains and stresses

TIMBER structures, western Am. *Eng* * Sep 23, Howe truss 180 and 250-ft. span, inset * Oct 7-**92**

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 RULO, report, Morison, bk. review *R & Eng* Feb -**91**
 St. Guistina viaduct. So. Tyrol, inset *E News* * Feb 1, 1-**90**
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 ST. LAWRENCE river, Lachine, Can. Pac R., inset *Eng* * Apr 13
 -**88**
 St. Louis, Mo., Merchant's, Miss. river, inset *Eng* * May 15,
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 -**89**; Grand ave., inset * July 18-**91**; Maline Creek * Feb 20
 -**92**; Grand ave (suspension) *E Rec* * June 6, 20, 27 * July 4 *
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 arch * Nov 23-**89**; Wabasha st., erection * Dec 26-**91** * Jan
 16-**92**
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 insets (full), construction, Wallace, superstructure, Breithaupt
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R Gaz Jan 6-**88**, *Am C E* -**87**

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stress and position of load, etc., Eddy, inset (very full) * v 22
-**90**; slide moment diag. for computing, Greiner *E News* Apr
14; web stresses with curved chords, Lindemberger, cor. * 21
-**88**; safe stresses in, Ottewell, diag. * Feb 23; allowable
strains in old, Fowler, cor. Apr 6; strains cal. by graph. method,
Baldwin, diag. * Sep 28 * Oct 12-**89**; device for cal. strains.
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May 10, do. Webb, cor. * Apr 12; strains produced by loaded
cars of 90,000 lbs. capacity, Blakely, cor. and ed. May 10;
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tures, Hiroi *R & Eng* * Oct -**88**

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downe, Robertson, insets *Inst C E* * v 103-**91**, do. *The Eng*
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- Bridges**, THAMES river, New London, Ct., N. Y. Prov. & Boston R., inset *Eng* * Apr 10 * May 8, 15-**91** ; *E News* May 19-**88** ; *E Rec* * Oct 11, 18-**90** ; *R & Eng* * June -**88**, Nov -**89**, report, Nov -**90** ; draw-br. pivot pier *R Gaz* * Nov 7-**90** ; lower single span, opening, proposed *The Eng* * Mar 18-**92**. See also BRIDGES, draw-bridges
- TIDE-water Pipe Co. suspen., Mauch Chunk, Pa. *E News* * Feb 25-**88**
- TIMBER rolling-br., in Drowtheim, Cauer, abs. *Inst C E* v 92 -**88**, *Zeit Bauwesen* -**87**
- TORKHAM, India, launching of, Ollenbach *The Eng* Jan 13-**88**, *Ind Engr*
- TOWER, London, inset *Eng* * Sep 23-**92** ; *E News* * July 6-**89** ; *E Rec* May 21-**92**, *R & Eng* * Oct -**90** * Oct -**92**, * *Industries* ; *The Eng* * Aug 16, 30, 30, Sep 6. 6 * Oct 18, 18 * Nov 8, 8, 15 * Dec 20, 20-**89** * Apr 17-**91**
- TRANSANDINE, inset *Eng* * Dec 2-**92**
- TRANSFER, Harsimn's Cove, Jersey City, Bensel, discuss., insets *Am C E* * v 19 -**88**
- TRESTLES. See TRESTLES.
- TRUSSES, formulas for wt. of, Du Bois *Am C E* * v 18-**88** ; abs. do. *Inst C E* v 96-**89** ; failures in 1889 and for 11 years, ed. *E News* Apr 19, 19 ; arch, Gilman, Aug 16-**90** ; truss deflection, J. Johnson *R Gaz* Aug 1-**90**
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- Two Medicine, Great No. R., St. Paul, Minn. & Manitoba R. *E News* * Mar 19-**92**
- TWYFORD viaduct, Didcot, Newbury & Southampton R. *The Eng* * Dec 18, 25-**91**
- VAN Buren, Ark. river, construction, Purdon, discuss., insets (full) *Am C E* * v 20 -**89**, piers erection, do *E Rec* * Jan 11-**90**
- VANDEVANDA, Penn. R. *E News* * Jan 12-**89**
- VERRUGAS viaduct, Oroya R., Peru, inset *Eng* * Apr 17 ; *Olcott E & Min* * Jan 24-**91** ; *E News* * July 27-**89** * May 9-**91**
- VIAUR, Du., viaduct Carmaux & Rodez R., proposed, inset *E News* * Nov 30, 30 *R & Eng* * Nov, *Genie Civil* ; *The Eng* * Dec 27-**89**
- VICTORIA, Stockton-on-Tees, Neate, inset *Inst C E* * v 109 -**92** ; Kilmarnock *The Eng* Aug 30-**89**
- VIENNA, Stephanie, Danube canal, abs. *Inst C E* * v 92 -**88**, *All Bauz* -**87**

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- Brooklyn**, navy yard *Eng* Oct 17-**90**. See also BRIDGES — RAILROADS, Brooklyn, etc.
- Brooks**, David, por. *El Wld* * June 6, *F Inst* July -**91**
- Brown**, C. E. L., por. *El Wld* * Oct 17-**91**
- Brown**, John *Inst C E* v 95 -**89**
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- Brush**, Charles F., por. *El Rev* * Aug 2, *Harpers W* July 26-**90**
- Buarque**, Antonio L. *Inst C E* v 100 -**90**
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- Buddicom**, William B. *Inst C E* v 91 -**88**
- Buell**, Madison, por. *El Eng* * Aug 19-**91**
- Buenos Ayres**, gas supply, Stevenson *Inst C E* v 103 -**91**
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- Buildings** and building, notes *E Mag* Oct -**91**. See also ARCHITECTURAL eng; ELECTRIC light stations; EXHIBITIONS; FOUNDATIONS; MILL construction; RAILROADS, buildings; RAILROADS, electric power stations; ROOFS, etc.
- AGRICULTURE, World's exhib., Chic. *Eng* * Apr 29, * May 6-**92**
- ALLEGHENY County Courthouse *E Rec* * Nov 10-**88**
- ANCHORING of, Goetz *Sc Am Sup* * Dec 21-**89**
- ARCADE, Cleveland *E Rec* * Mar 21, 28 * Apr 4-**91**
- ARMORY, O. N. G., Cincin. O. *E Rec* * Dec 7, 21-**89**; 12th reg't, N. Y. * Jan 7-**88**
- ASSOCIATIONS *Sc Am Sup* Dec 28-**89**
- AUDITORIUM, Chicago *Eng* * Apr 3, 24-**91**, *E Rec* * Apr 12, construction * Nov 22, 29-**90**, * Feb 21, * Mar 7-**91**; *Locom* May -**90**
- BATHS, European public *E Rec* * Apr 18, special bath-room * Oct 3-**91**
- BEAM anchoring, Goetz-Mitchell sys., com. rep. *F Inst* * Nov -**91**
- BOILER shop, Pitts. Locom. works *R Gaz* * Feb 7-**90**
- BOSTON Chamber of Commerce *E Rec* * May 7, 28, * June 4; building law, Aug 6-**92**
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R Gaz Apr 10-91. See also CANALS, Lakes

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SIDHNAI system, MacLean, abs. *Inst C E* v 103 -91

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BRUNIG, Paris exhib. *Eng* * Aug 23-89

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CALEDONIAN R., inset *Eng* * Feb 21-90

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CHOCK, for stopping *E News* * Aug 9-90

CLEARANCE in width required by *R Gaz* * Nov 9-88

COAL, Chic. Rock Is. & Pac. standard, inset *E News* * Aug 11 -92; Tex. & Pac. *R & Eng* * Nov -91; standard * Apr * May -92

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Car COUPLERS

- Barnes, and aut. air brakes * Jan 2, Feb 6, ed. 6; what constitutes a defect in ver. plane, discuss. 23, mixed unlocking gear disadvantages * Nov 13-**91**; strength, Forsyth, Mar 4, 11 -**92**
- BLACKSTONE's platform and *R Gaz* * July 15-**92**
- BUHOUP's *E News* * August 25-**92**
- CHICAGO, the *R Gaz* * Nov 14-**90**
- DREXEL *R Gaz* * May 15-**91**
- EMPIRE *R & Eng* * June -**92**
- FOX aut. vertical plane *R Gaz* * June 20-**90**
- HINSON *E News* * Aug 1-**91**
- HUSELTON aut. *R Gaz* * Apr 11-**90**
- JANNEY frt., safety stop for *E News* * Jan 2-**92**; *R Gaz* * Feb 17-**88**, vs. Miller, ed. Apr 11, evolution of * June 6, life of, diagrams of broken * Nov 7-**90**, with Bentley's vestibule * May 1 -**91** failures * May 13-**92**
- KEYSTONE *E News* * Nov 2, *R Gaz* * Nov 8-**89**
- MASTER Car Builder's aut. *E News* introduction of, ed. Mar 28, R's equipped with, inset map * Apr 25, 25 * June 13, standard gauges for * Sep 19-**91**, strength, Forsyth * Mar 5-**92**
- R & Eng* form of contour lines, report * May -**88**, standard gauges * Oct -**91**, possibilities of, discuss., Eastwick (full) * Apr, May -**92**
- R Gaz* * Apr 20-**88**, at interchange points, ed. * July 25 * Aug 18, on curves * Oct 3-**90**, broken knuckles * Jan 2, cost, ed. May 15, report * June 12, standard gauge * Sep 18-**91**, M. C. B. Assoc. action, Apr 22, testing machine * Sep 2-**92**
- ROBERT-Eastwick *R Gaz* * June 6-**90**
- TESTING, method *R Gaz* * Aug 19, testing machine * Sep 2-**92**
- THURMOND frt. *R Gaz* * June 5-**91**
- TROJAN *E News* * Nov 29, *R Gaz* * Dec 5-**90**
- UNION aut. *R Gaz* * Jan 30-**91**
- VAN Dorston and buffer *R Gaz* * Dec 14-**88**
- DERRICK, 15-ton, Penn. *R Gaz* * Oct 18-**89**, 10-ton, Balt. & O. * Jan 9-**91**
- DRAW-bars, height of M. C. B. com. report *E News* June 28-**90**; Graham's draft rigging, Penn. R., discuss. *R Gaz* * Mar 29, 29; Cushing's stop * Oct 25; Chic & N. W. * Nov 1-**89**; Safford aut. * Oct 17-**90**; Butler draft gear * Apr 1; draft gears for frt. cars, Barnes * June 3-**92**

- Cars, DUMP**, Can. Pac. *E News* * July 21-**88**; rotating * July 12-**90**; iron, No. R. of France *R & Eng* * July -**88**; the Goodwin * July -**89**; Thacher compressed air * Dec -**92**, do. *R Gaz* * Nov 11-**92**; George's Creek & Cumb. * Jan 25-**89**; and gondolas, Goodwin, Jan 31; standard, B. & A. * Mar 7-**90**
- FRANCE**, experimental, West. R., Paris exhib. *Eng* * Oct 4; local R's 2d class, Paris exhib. * Nov 29; 1st class, So. R., inset * Dec 13-**89**; State R * July 4-**90**; pass. *R Gaz* * May 15-**91**. See also **CARS**, dump—freight
- FREIGHT**, Goodfellow & Cushman's *Eng* * Dec 7-**88**; unloading by steam shovel *E News* * Oct 5-**89**; construction imp., Barnes * Jan 30; lubrication, cost, Dec 1-**92**
- R Gaz* relative cost of car load and less, Fink, Feb 3; depreciated values, table, Apr 27; ballast and plow, Roger's * July 27-**88**; equity of per diem and mileage plan, Yardley, Wattson, cor. Mar 15, Apr 5; relative econ. of large and small capac., ed. Apr 26; springs, bolster, tests, Hazlehurst, diags. * Oct 4-**89**; end platforms for, ed. Jan 10; housing for gondolas and stock * Mar 28; ventil., Pancoast's system * Apr 11; mileage decrease on home roads, Wattson, July 11; handling and distrib. on West Shore Oct 10-**90**; Harvey steel box * June 5-**91**; construction and design, Barnes * Jan 29, Lamont's steel * Feb 5-**92**
- BALT. & O.** 50,000-lb. box, details *R Gaz* * Mar 27-**91**, iron box *R & Eng* * Dec -**92**
- BELGIUM**, Grand Cen. R. wagon, Paris exhib. *Eng* * Oct 11-**89**
- BUFFALO**, Roch. & Pitts. 60,000-lb. box and truck *R Gaz* * Dec 19-**90**
- CHESAPEAKE & O.**, combination *R Gaz* * Feb 1-**89**; stone * Sep 23-**92**
- CHICAGO**, Bur. & Q. standard *R Gaz* * June 21-**89**; & N. W. standard, 50,000-lb., box (full) * Jan 10-**90**; Rock I. & Pac. coal, standard, inset *E News* * Aug 11-**92**
- DENVER & Rio Grande** box, standard gauge *R Gaz* * Oct 9-**91**
- FRANCE**, So. R. cattle wagon, Paris exhib., inset *Eng* * Nov 8, platform wagon, do. * Dec 20-**89**
- GERMAN** composite *R Gaz* * Dec 27-**89**
- HOELLENTHAL R.**, inset *Eng* * Mar 13-**91**
- INTERCHANGE** rules *R Gaz* May 24-**89**, com. report, May 22-**91**
- LAKE Shore**, 30-ft. standard *R Gaz* * Dec 30-**92**

Cars, Freight, LEHIGH Valley, 50,000-lb. standard *R Gaz* * June 8; twin hopper bottom gondola, 60,000-lbs. * Sep 14-**88**; 50-ton capac. platform car * Aug 16-**89**

NEW YORK, L. Erie & W. side-dump, 80,000-lbs. capac. *E News* * Apr 19, 19-**90**

NEWPORT News & Miss. Valley gondola *R Gaz* * Apr 6-**88**

NORTHERN Pac. hopper side chute *R Gaz* * Apr 5-**89**

PENN. 100,000-lb. *R Gaz* * May 11-**88**; 40-ton side-dumping gondola * Mar 15-**89**

SPAIN, 13-ton iron ore wagon, Parcocha R., inset *Eng* * July 17-**91**

TUBE-frame, Jefferts *Eng* Nov 7 * 28-**90**, do. goods wagons, insets (full) *Inst M E* * Oct -**90**, do. cor. *R Gaz* June 5-**91**, do. and effect on expenses of R's *The Eng* * Nov 14-**90**

GATES, the Gold platform (N.Y. eleva. R.) *R Gaz* * Nov 30-**88**; B. & A. * Mar 21-**90**

GREAT So. & W. of Ireland, composite *Eng* * Oct 19-**88**

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HEATING, Bache's heater, com. report *F Inst* * Aug -**88**; Leland hot water heater *R Gaz* * Sep 11-**91**; hot water continuous, Safety Co. * Sep 6-**89**

STEAM, notes on, Baldwin, a safety system, Towne *Am M E* * v 9 -**88**; safe train system, Gibbs' car *El Wld* * June 21 -**90**; appliances *Eng* * Mar 4-**92**; Waitt *E & Min* * Oct 1 -**92**

E News steam from the locomotive, com. report, June 30; Baldwin * Aug 18-**88**; non-pressure system * May 18-**89**; by direct steam, June 7 * Nov 22; prog. of steam heating, inset map and ed. (full) * June 7, 7; Consol. Car-heating Co. systems * Sep 6, do. aut. temp. regulator, 20-**90**; diagram * May 16-**91**; standard couplings * June 16; Waitt, Sep 29 -**92**; P. Atkinson *Lehigh Eng J* June -**89**

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- Cars**, Heating, Steam, CALEDONIAN R., exhaust steam ap., Drummond *Inst C E* * v 92 -88, *The Eng* * Jan 4, 4-89
- CHICAGO, Mil. & St. P. contin. *R Gaz* * Jan 13-88, light and heat tender (full) * June 13-90
- ERIE system *R Gaz* * Feb 3-88
- GIBBS' safe train system *El Wld* * June 21-90, steam hose coupler *E News* * Dec 5-91
- GOLD continuous system, Lehigh Valley *R Gaz* * Mar 9; storage, test, May 11-88; * Aug 30-89; coupling and joints * Mar 21; * June 6; coil and Baker stove * Dec 26-90
- MARTIN coupling *R Gaz* July 18-90
- MC ELROY system, test *R Gaz* Apr 6-88
- NORTH Western system, coupling and trap *E News* * Mar 30-89; *R Gaz* * Jan 27-88
- PENN. R., Ely *E News* * Nov 15, *F Inst* * Nov *R & Eng* * Dec -90; Williams' system, expt. *R Gaz* Feb 24-88; continuous * Mar 22-89
- ROBERTS' system, *R Gaz* * Apr 17-91
- SEWALL contin. system, hose coupler *E News* * Nov 21-91; *R Gaz* * Jan 20-88
- WILLIAMS' system, Penn. R., expt. *R Gaz* Feb 24-88
- INDIAN State carriages, Rajah *The Eng* * Nov 4-92
- INSPECTION, Susque. Coal Co. *E News* * Aug 17; Penn. R. * 31-89; the Ionia *R Gaz* * Apr 26-89; joint insp., com. report, June 19-91; saloon, So. E. R. *The Eng* * Aug 14, 21-91
- INTERCHANGE rules, M. C. B. report *R Gaz* Apr 8-92
- IRON and steel, construction, steel plate and malleable iron in, M. C. B. report *E News* * June 14-90; steel stock car, inset * July 11-91; iron con., pros and cons, ed. May 19-92; iron dump frt., No. R., France *R & Eng* * July -88; iron box, B. & O. * Dec -92; iron construction, Ettenger *R Gaz* Nov 30-88; Am. steel fire-proof postal * Jan 4-89; Schoen pressed steel, inset * May 23-90; steel in car construction, Mar 27; Harvey steel box frt. * June 5; pressed steel and malleable iron con., com. report * 12-91; construction and design, Barnes * Jan 19; Lamont's steel * Feb 5; Harvey steel construction * 26; iron and steel box, Mex. R. * Aug 5-92. See also CARS, tube-frame
- LAKE Shore & Mich. So. standard pass. *R Gaz* * Sep 16-92
- LIGHTING, electric, Leonard *El Eng* July 9-90, Bauer, June 8-92, Timmis *El Rev Lond* * Sep 11-91, do. *El Rev* Jan 11-

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92, with storage (secondary) batteries, A. Brown *El Wld* * June 1-**89**, Bauer, June 11, Silvey storage battery system * Dec 31-**92**, Sartiaux *Eng* * Oct 25-**89**

E News, systems, cost. ed. and cor. May 25; with storage (secondary) batteries, A. Brown, July 6-**89**; electric, Penn. R., inset * Aug 23, do. Sartiaux, Nov 1-**90**; modern methods and ed. Mar 7, 7, 14, comparative merits, various systems * Apr 18, 25 * May 2-30 * Aug 15, 22, the Pintsch compressed gas system * 29 * Sep 5, 19, 26, oil lamps * Oct 10, 17, electric * Nov 14, 21 * Dec 5, 19-**91**, Mar 12-26, Apr 2, 9, and ed., 16, 16, Bauer, June 9-**92**

Inst C E electric, Sartiaux, abs. v 101 -**90**; Langdon, discuss., inset * v 106 -**91**; *An Telegr* v 17 -**90**

R Gaz electric, Timmis * May 18-**88**, ed., Feb 8, Waite, Mar 1, Frost dry carburetter system, Penn. R. * June 7, elec. light car, Cumb. Val. * 21, elec., Selden, Oct 25, elec. in Am. and Europe, Sartiaux, Nov 29-**89**, by power from the axles, arr., Lond., Brighton & So, Coast R. * Jan 3, Gibbs, * Feb 7, light and heat tender, Chic. Mil. & St. P. (full) * June 13, elec., Leonard, July 11; Frost carburetter tests * 18-**90**; Gibbs elec. (full) Mar 6, (cost, various systems) cor. Aug 28-**91**

LONDON & S. W. works, Eastleigh, England, *Eng* * July 29; bogie composite * Aug 5-**92**

LUBRICATION, Hall *E News* * June 27-**91**; lubricants, English, and testing *R Gaz* * Feb 14-**90**

MEXICAN R. iron and steel box *R Gaz* * Aug 5-**92**

PAINTING, Master Car & Locom. Painter's Assoc. pro. *R Gaz* Sep 20-**89**, Sep 19-**90**, Oct 2-**91**; M'Keon *Sc Am Sup* Oct 1-**92**

PLATFORM, Miller, and coupler patents *R & Eng* * Jan -**88**

PORTABLE partition *E News* * May 30-**91**

PASSENGER, Hoellenthal R., inset *Eng* * Feb 27-**91**; Am. compartment, Wagner Co. *E News* * June 16, special, World's exhib., inset * Nov 17-**92**; Pullman vestibule sleeping *R Gaz* * Nov 23-**88**, Pullman, imps. * Feb 14; Farmer's, with side entrance * Sep 19; Wagner compartment sleeping * Oct 31; Harris sleeping excursion 'Jeannette,' inset * Nov 28-**90**; Bissell 'Gould' platform and vestibule * Mar 18; (various roads) dimensions, Dec 30-**92**; Pullman train in England, ed *The Eng* Dec 14-**88**. See also CARS, under names of R's.

Cars, REFRIGERATOR, Zimmerman aut. *R Gaz* * Jan 20-**88**; the Hanrahan * Oct 30-**91**

REPLACER, Reed's *E News* * Jan 26-**89**; the Norwood * May 17-**90**; Hynes *R Gaz* * Jan 3-**90**. See also BRIDGES, Railroad, guards — rerailers

ROOFS, M. C. B. com. report *R Gaz* * June 22-**88**; Woods, Feb 12-26-**92**

SCHOEN pressed steel, inset *R Gaz* * May 23-**90**

SEAT, Forney's *R & Eng* * June -**89**; the Emmert *R Gaz* * Mar 23-**88**

SERVICE, Wattson *R Gaz* Jan 23-**91**; settlements, ed. Jan 29-**92**. See also RAILROADS, demurrage

SIGNALS, between pass., guards and engine driver, Urquhart, inset *Inst C E* * v 106 -**91**

SILL repairs and general averages *E News* Aug 11-**92**

SLEEPING, discomforts of, ed. *R Gaz* Jan 3-**90**

SOUTH Eastern, England, Am. for, inset *Eng* * Oct 30, 30 inset *E News* * Oct 10; inspection saloon *The Eng* * Aug 14, 21-**91**

SOUTH Mahratta R., 3d class bogie *The Eng* Feb 3-**88**; composite, inset * Mar 20-**91**

STOCK, steel, inset *E News* * July 11-**91**

TRANSFER str. Ann Arbor *R Gaz* * Aug 19-**92**

TRUCKS, electric *El Rev Lond* * July 11-**90**; spring tip, for heavy rock *E News* * Oct 5-**89**; devices for side motion in * Jan 17-**91**; standard frt., Harvey Steel Car Co. * June 16-**92**; Jewett metal *R Gaz* * June 14; Rich. & Dan. R. * Sep 13-**89**; Fox solid pressed steel pass., inset * June 6; safety chains, ed. Aug 15, fastening, proposed, lateral motion, ed. * 22, ed. * 29, ed. * Sep 5; swing beam and rigid and flange wear of wheels, discuss. 26, Nov 14, ed. Dec 5-**90**; radial, errors in theory, ed. Feb 13; Barber roller bearing * 20; Fox solid pressed steel * Mar 27; radius bars, length, Woods * May 15; 50,000-lb. N. Y. Cen. standard * June 5-**91**

TUBE frame, Jeffers, cor. *Eng* Feb 12-**92**. See also CARS, frt., tube frame

VESTIBULE, Pullman sleeping-car *R Gaz* * Nov 23-**88**; Howard's * Mar 27; Barr's, Chic. Mil. & St. P. * July 17-**91**; and Bissell 'Gould' platform * Mar 18-**92**

WHEELS, and rail sections proper relation, com. report (full) *Am C E* * v 19 -**88**; flat topped rails and cyl., Whittemore, com. final report. insets (very full) * v 21 -**89**; good and bad,

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report *E News* May 19; crushing strength per sq. in., ed. 26 -88; worn, mileage of, Penn. R., diagram * Jan 12; and axles, condemning, Penn. R. rules, Mar 9; M. C. B. standards, Aug 3-89; discuss. Feb 22; machined, N. Y. Car. W. works, July 12 * 19-90; sections. Griffin * June 27-91; cracked plates, cause (full) * Oct 13-92

Inst C E wear of tires and rails on curves, Helmholtz, abs. v 93 -88, *Zeit deut Ing* -88

R & Eng steel tired, new method * Feb, foundry plant, Whiting's * May, Griffin grinding machine * Dec -89; and axles, Aitken's ap. for rolling, pats. * Sep -90; guarantees, Griffin, Sep -91

R Gaz axles and track, discuss. Feb 17; Snow. 24, Peckham paper * 24 * Mar 2; steel-tired and chilled, Mass. R. Com's report. May 11; method of comparing cost, June 1; safe (cost etc.), ed. May 25; the contracting chill in wheel making, Barr * Dec 28-88; cast iron chilled. and ed. Jan 11; flat-topped rails and cyl. wheels, Whittemore * 25; 33-in. standard * Mar, 8; and rails, form of. report * May 17, June 28; cast iron, specs., M. C. B. report, July 5; contracting and non-contracting chills, discuss. Nov 15-89; chilled, form of contract for, Feb 14, Mar 21, Whiting foundry plant * July 11-90; best diam., Porcher, Feb 27: imps., Griffin, Mar 6; counter, Schilling's * 20; sections and mechan. conditions, Griffin, June 12; rolling machine, Jones' * Oct 9-91; record, Barr, Oct 14-92, *J Assoc E Socs*

Sc Am Sup R. Hunt (full) * Aug 2, 9-90; best diam., Porcher, Mar 21-91; chilled iron and steel-tired, proper method of comparing cost, Swain *Tech Q* May -88; Peckham paper *The Eng* * June 7-89. See also *LOCOMS.*, driving wheel tires WINDOW, De Kalb's ventilating *R Gaz* * July 25-90

Cartridge machinery Eng * Oct 10-90

Casting, first made in Am., Woodbury *E News* * Dec 1. *Iron Age* * Dec 8-92

Cast iron, aluminum in, Keep, ed. *Eng* Aug 31, 31; influence of al., do., Mabery, Voice *E & Min* * Aug 18, *Sc Am Sup* * Sep 8-88; and steel, internat. stresses in, Kalakoutsky *The Eng* June 15-88

AMERICAN foundry, notes, Keep *Sc Am Sup* June 16-88, *Industries*

Cast iron, ARTISTIC treatment of, Lethaby (full) *Sc Am Sup* * Apr 12-90. *J Soc Arts Lond*

MANGANESE in, Keep (full) *Am Min* * v 20 -92

MECHANICAL purposes, for, Deny, abs. *Inst C E* v 92 -88, *Indus Soc Mul* -87

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SILICON in, Keep (full) *Am Min* * v 17 -89, *Eng* * Aug 2, 9, 23, 30-89; and sulphur in, Turner, May 18-88

STRENGTH, resilience, tests and specs., J. Johnson, discuss. (full), insets *Am C E* * v 10 -89, v 22 -90, abs. *Inst C E* v 101 -90, *Eng* * July 4-90, *R Gaz* * Sep 13-89; tests, Lanza *Am M E* * v 10-89, *Tech Q* Dec -88. See also MATERIALS, strength; TESTING

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ATHENS, Ga., Ledlie *E News* * May 5-88

AUSTIN, Texas, Col. river *E News* * July 11-91; Fanning, report, Frizell * Sep 29-92

BEAR Valley, Cal. See DAMS, Sweetwater

BEETALOO water-works, So. Australia, concrete *Eng* * July 3-91; Moncrieff *E News* * May 30 * Sep 19-91; *R & Eng* * July -91; *The Eng* * May 8-91

BETHEL, Ct., water-works, and filter bed, proposed *E News* * Mar 7-91

BHATGARH *R & Eng* * Aug -92

BLACK Eagle Falls, Great Falls, Mont., Parker, discuss., insets *Am C E* * v 27 -92; *E Rec* * Oct 8-92

BOIRE river *E News* * Apr 26-90

BUTTE City water-works, concrete masonry *E News* * Dec 15, 22 -92

CAMBRIDGE water-works, Mass., Stony Brook, Barbour *E Rec* * Jan 5-89

CASTLEWOOD, Denver Water Storage Co. *E News* * Mar 22 -90

Dams, COFFER-dams and floating caissons, R. Hunt *E & Min* * July 19, 26-90

CONEMAUGH, Johnstown, Pa. *The Eng* * June 21-89, *E Rec*

CROTON water-works, N. Y., Convent ave. gate-house *E News* * Sep 1, 15-88; inset * Nov 15, 15-90; inset * June 2-92; Fteley report *E Rec* * Oct 18-90. See also DAMS, Quaker bridge, Sodom

CURVED vs. straight, Bell *E News* Mar 31; strains in, Church, cor. * Dec 1, cor. * 28-88; cor. Aug 16; masonry, strains in, Martin, cor. Sep 27-90

DAVIS Is. movable, Ohio river, Pitts., Pa. *Sc Am Sup* * Aug 1-91

DENVER, Col., Citizen's water Co., large, n *E News* Sep 20-90. See also DAMS, Castlewood

ENGLISH. Sierra Co., Cal., destroyed *E News* * July 6-89

FOLSOM, Am. river, Cal. *E News* * Oct 17-91, *R & Eng* * July -92

HOLYOKE, Mass., Whiting st. *E News* * Sep 6-90

KINGSTON's floating scouring *Eng* * Oct 26-88

KIRK wooden *E News* * Apr 28-92

LAWRENCE, Merrimac river, Hale *E Rec* * May 4-89, *J Assoc E Socs*

LUMBER, Penn., inset *E News* * Sep 5-91

MOVABLE, Pochet's (full) *Sc Am Sup* * May 24-90, *Genie Civil*. See also DAMS, Davis Is.

MUSKINGUM river *E Rec* * Mar 8-90

NEW Brunswick water-works, a dubious, Hill, cor. *E News* * June 16, proposed * 23-88

NILE barrage *E News* Sep 27-90

NORTHFIELD, Vt., a very bold arch *E News* * Sep 20-90

PAWTUCKET water-works. R. I. *E News* * June 1-89

PECOS river, N. M., rock fill *E News* * May 17-90. See also DAMS, reservoir

PERIYAR, Madras *Eng* * Nov 25, inset * Dec 9, construction *E Rec* * Dec 31-92

POTOMAC river, Wash. water-works, constructing, Chittenden, inset *Am C E* * v 18-88

QUAKER bridge, Croton aqueduct. N. Y. water-works *E News* * Feb 4, table, 11, design of, ed. 25, Marichal, cor. Mar 10; report and ed., inset * Nov 3, 3-88; Fteley, Oct 11-90; map *E Rec* * Oct 6; report *R Gaz* * Oct 12, 26; Tratman *The Eng* Jan 27, Apr 20, Nov 30-88. See also DAMS, Croton

- Dams**, RESERVOIR, safety of, Kresnik *E & Min* * Mar 1-90, *Inst C E*; rock fill, ed. *E News* July 28, Aug 11, and Schuyler, cor. Sep 22-88; and Conn. law, ed. Aug 24-89; European, Kresnik, Mar 15; Apr 12; measures for safety of, do. May 10; and embankments for water-works, inset * June 21-90. See also RESERVOIRS; WATER-works
- SODOM, Croton, N. Y. water-works, n *E News* * Dec 1-88; Oct 25-90; *Sc Am Sup* * Jan 5-89
- SOUTH Fork reservoir failure, cause, com. report, discuss. (very full), insets *Am C E* * v 24 -91; *Eng* * June 7-89; and Johnstown disaster *E News* * June 15-89; com. report *E Rec* * Aug 29 * Sep 5-19-91
- SWEETWATER, San Diego Bay, construction, Schuyler, discuss., insets *Am C E* * v 19 -88; and Bear Valley, do. *E News* * Apr 7, F. Brown (Redlands, Cal.) * June 23, Schuyler * Oct 27-88; Nov 23, 30-89; Schuyler, abs. *Inst C E* v 97-89
- TANSA, Bombay water-works, inset *Eng* * Apr 29; *E News* * June 30-92; *E Rec* * Dec 19-91
- VYRNWY lake masonry, Liverpool water-works *E News* Dec 29-88; and ed. * Aug 18-92; *R & Eng* * Jan -89, *Industries*; *The Eng* * June 27-90
- WALNUT GROVE, Ariz., disaster *E & Min* * Mar 1-90; *E News* Sep 22 * Oct 20, Nov 3-88; * Mar 8-90
- WATER-works, of U. S., (list) *E News* June 15-89. See also RESERVOIRS; WATER-works
- WESTPHALIA, Verse river, proposed, inset *The Eng* * Feb 1, 8-89
- Daniel**, John, por. *E & Min* * Feb 28-91
- Davenport**, Thomas. (inventor elec. motor), Pope, por. *El Eng* Jan 7; some cor. *El Wld* Apr 25; *St R J* * Apr -91
- Davidson**, Robert, por. *El Wld* * June 20-91
- Davy**, Humphrey *Eng* Jan 8-22, Feb 12-92
- Day**, David T., por. *E & Min* * May 23-91
- Death**, Mitchell *Sc Am Sup* Oct 15-92, *Nat Sci*; origin of, Gardiner *Tech Q* July -91
- Dean**, John, por. *E & Min* * Dec 20-90
- Debts**, county, of U. S., diagram *E News* * Sep 6-90
- De Camp**, Edward F., por. *E & Min* * Sep 12-91
- Decorticating** machinery *The Eng* * Dec 27-89
- De Lamar**, J. R., por. *E & Min* * Sep 5-91
- Delta** metal, *E News* July 26-90

- Denham**, Henry M. *Inst C E* v 91 -88
- Denny**, Robert *Inst C E* v 95 -89
- Denny**, William (ship builder) bk. n *Eng* Jan 25-89
- Dentistry**, mechanics of, Sweet *Cassier's* Nov -92
- Deserts**, Am. Sahara, 'Valley of Death' *Locom* Jan -91; great, of the earth, James (full) *Sc Am Sup* June 22-89
- Derricks**, hydr. and steam, Brown Bros. *Eng* * Apr 18 -90; stresses in, Elliott * July 10-91; hydr. hoist, H. M. S. Vulcan * Nov 18-92; derrick plant for Equit. building, Denver, Col. *E News* * Aug 22-91; 15-ton. Butter Bros. *The Eng* Mar 2-88. See also CRANES
- Devonshire**, Duke of (W. Cavendish) *Inst C E* v 107 -92
- Diamond** mining and industry, etc., polishing *Eng* * Feb 8-89; washing machinery * Apr 25-90; Kimberley stats., So. Africa, Sep 4 -91, report Dec 23-92, do., Stonestreet *E Mag* * Aug -91, do. *E & Min* Sep 19, discov., Thorburn, Oct 24 -91; Kimberley indus., Churchill, *Pop Sci* * Aug -92; mines, Africa *Sc Am Sup* * Aug 22-91; the De Beers mine *The Eng* Aug 17-88. See also GEMS
- Dibblee**, Frederick L. *Inst C E* v 97 -89
- Dick**, Charles *Inst C E* v 94 -88
- Dickinson**, George C. *Am C E* v 26 -92
- Dictionary**. See CENTURY dictionary
- Diet**, proper, for hot weather, Davies *Pop Sci* July -92
- Dikes**, Holland, notes, Starling, discuss., map, insets (very full) *Am C E* * v 26-92, do. *R Gaz* Nov 11-92; compound (stone), most economical cross-section of, d'Auria *F Inst* * June -88. See also CANALS; DAMS; RESERVOIRS; RIVERS, etc.
- Dirks**, Justus *Inst C E* v 92 -88
- Disasters**, in Aug., ed. *E News* Sep 8-88; great, earthquakes, floods, etc., ed. July 6-89. See also BRIDGE accidents; BOILER explosions; FLOODS; STEAMERS; RAILROADS, accidents, etc.
- Discoveries**, great, of past sixty years *Locom* Sep-Nov -89
- Disinfecting** ap., Koch, abs. *Inst C E* v 96 -89, * *Bul Soc Mul* -88; *Sc Am Sup* * June 30-88, *The Eng*
- Disintegrator**, the devil *Eng* * Aug 10-88; trials *The Eng* * June 27-90. See also CRUSHING, GRINDING
- Disk**, hollow cast iron, strains in, Leverich *Am C E* * v 18-88
- Dividing** engine, 40,000 lines to the inch, Rowland *E News* Feb 18 -88

Diving boats *Eng* Mar 15, Apr 5-**89**; Stove's diving dress * Mar 28-**90**

Dixon, John *Eng* Feb 6-**91**, *Inst C E* v 104 -**91**

Docks, Auckland, N. Z., calliope graving, Swainson *Inst C E* v 101 -**90**

BARRY, works, J. Robinson *Eng* Apr 11-**90**, hydr. machinery and mode of tipping coal, discuss., insets *Inst C E* * v 101 -**90**

BOMBAY graving, proposed *Eng* * May 18-**88**

BRISTOL *The Eng* * Oct 14-**92**

BROADSIDE dock slip, for ships *Sc Am Sup* * Aug 8-**91**

BROOKLYN Navy Yard dry-dock, Simpson *Eng* * Aug 22, *R & Eng* June -**90**

CARDIFF schemes, Bute dock, map *The Eng* * Dec 9-**92**

CHATHAM *The Eng* * July 24-**91**

CUBA, crib for Signa Iron Co. *E News* * Apr 9-**92**

DRY-docks, of world *R & Eng* Aug -**89**; Wivenhoe *The Eng* * Feb 21-**90**. See also **DOCKS**, names of places

ESQUIMALT, Brit. Columbia, inset *Eng* * July 20, inset * 27-**88**

FLOATING, and pontoon, Taylor *Eng* * Aug 10, do. *Sc Am Sup* * July 7-**88**; offshore, Hamburg * May 10-**89**, do. *The Eng* *

Mar 11-**92**; Limerick, steel gates, Hall *E Rec* Apr 10-**90**, do. *Inst C E* v 97 -**89**

GLASGOW harbor *Eng* * Aug 9-**89**; the Cessnock *E News* June 2-**92**

GRAVING *Eng* Nov 18-**92**, *Inst C E*. See also **DOCKS**, names of places

HALIFAX, Nova Scotia, graving *The Eng* * Feb 28-**90**

HAMBURG floating offshore *Eng* * May 10-**89**, *The Eng* * Mar 11-**92**

HAVRE port dry-dock *E Rec* * Dec 3-**87**, * *Genie Civil*; Bellot dock, Desprez, abs. *Inst C E* v 101 -**90**, *An Ponts* * v 17-**89**

HULL, Alexandra, Hurtzig *Eng* Feb 10, discuss., inset *Inst C E* * v 92 -**88**

INDIA, East & West, arbitration *Eng* Dec 28-**88**

LEAGUE Island dry-dock *E News* * Mar 14-**91**

LIMERICK, floating, gates, Hall *E Rec* Apr 10-**90**, *Inst C E* v 97 -**89**; failure of walls and methods for reconstruction, Hall, inset * 103-**91**

LIVERPOOL, port and Mersey river, dredging *Eng* * May 30 * June 6; Lyster, Jan 17, extensions, discuss., insets (very full) *Inst C E* * v 100 -**90**; Mersey estate *Inst M E* July -**91**

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Docks, MARE Island, Cal., dry-dock *E Rec* * Feb 13-92

MARQUETTE, Mich., ore dock, Duluth, So. Shore & Atlan. R.
E & Min * Jan 10-24-91

NEW York dock walls *E Rec* * Sep 3, Oct 1-92

PORTSMOUTH dockyard *Eng* July 29 * Aug 5, 5, lifting ap., Corner, 26-92

PRESTON scheme, ed. *The Eng* June 29-88

PUGET Sound, Wash., U. S. Naval station, inset *E News* May 19-92

SAN Francisco dry-dock, hydr., Union Iron works *R Gaz* * Nov 27-91

SOUTHAMPTON tidal *Eng* * Sep 12, inset *The Eng* * July 25-90

Domestic motive power by atmos. exhaustion, Dollfus, abs. *Inst C E* v 93 -88, *Bul Soc Mul* -88; motors worked by rarefied air, Bourdenoot, abs. v 96-89, *Compt r* Feb 1-89

Dolivo-Dobrowolsky, Michael Von, por. *El Wld* * Mar 19-92

Dom Pedro, ex-Emperor of Brazil *Inst C E* v 108 -92

Douglass, Archibald Bryce - *The Eng* Apr 10-91

Dovetails, holding power of, Poe, report *E News* * Dec 20-90

Downes, Charles C. *Inst C E* v 92-88

Downing, Samuel F. *Inst C E* v 109 -92

Drainage, tables, G. Johnson *E News* May 5, 12-88; blunders, Webster *E Rec* * Dec 10, 24-92; hints, Chandler *Tech Q* Dec -88. See also SEWERAGE

CHARLESTON, S. C., tidal *E News* Oct 25-90

CHICAGO, drainage canal *E News* * June 2, 30-92; *E Rec* May 23-91

FENS and lowlands, by gravitation and steam power, Wheeler, bk., Spon, Lond. -88

HOUSE, domestic and water supply, Hartford *E Rec* * Apr 2, 16-92; Chandler *Sc Am Sup* Jan 26-89, *Tech Q*

LOUGH Erne, Price, discuss., inset (full) *Inst C E* * v 101 -90

KANKAKEE marsh, Chic. canal *E News* * Nov 3, 3-92

MEXICO, Valley of, Chism, map *E & Min* * Dec 8, 15, 22-88, map *E News* * Aug 10-89; City of Mex., hist. sketch, Noll *E Rec* Mar 16-89; Val. *Sc Am Sup* * Aug 10, map *The Eng* * June 28-89

WIESBADEN-Essen-Halle, abs. *Inst C E* v 96 -89, *Deut Vier Ges* -89

Draw-bridges. See BRIDGES, draw-bridges

Drawing, section lining, standard, Van Vleck *Am M E* * v 9-88; Holman *Cassier's* * Sep-92; drawing-board, vertical *Eng* * Jan 13, do. Vorth's *E News* Apr 7-88; section-liner and scale divider, Both's * Oct 12-89; T square, Deane's adjustable * Sep 13-90; essentials of mechanical drawing, Forney (very full) *R & Eng* * Mar - * Dec -90 * Jan - * Dec -91 * Jan -92; as a means of education, Ablett *Sc Am Sup* July 7-88; simple method (artistic), Jacquot * Mar 29-90. See also INSTRUMENTS, curve rule

Dredge, James, Wiley, por. *Cassier's* * Feb -92

Dredgers and excavators, Panama canal, Williams, insets *Am C E* * v 19-88; steam excavs., Clements *Am M E* v 9-88; Bennett elec. and amalgamator *El Rev* * May 23-91

Eng double-ladder, Swansea harbor, inset * July 13; frictional gear for, Griffith * Aug 24; 'Kuphus' hopper, Bombay Port, inset * Dec 7-88; hopper suction 'Libana,' Port of Libau, inset * Jan 11; shore delivery for lake Copais * Feb 1; dredging cost, Apr 26-89; sand pumping, Mersey bar, ed. Apr 11, and docks * May 30 * June 6; Cockburn crane and grab * Oct 3-90; for excav. gold-bearing river beds * Jan 9; steam crane excav., Weser river imp. works * 16; dredging and amalgam. plant, inset * Mar 27; Manchester canal soil transporter, inset * July 24-91; floating elevator, transformation * Aug 19; Jupiter twin screw suction pump * Sep 30-92

E News Panama canal plant * Aug 18, 25; French suction, Vernandon * Nov 10-88; English, cost of, May 11; Lobnitz rock * Jan 26, work of * Oct 19-89; German stone * Aug 16-90; Man. canal soil transporter, Sep 5-91; ap. for N. Y. harbor, Edwards, inset * Mar 19; the Booth pump * 26; trestle filling, N. Or. & N. E. R. * Aug 4; dredging on Pac. coast, Miller, 4 * 11-92; Lobnitz rock, removal under water without explosives *E Rec* * Oct 12-89; four-screw hopper, Walker * Feb 13-92, do. inset *Inst C E* * v 107-92; the von Schmidt, Higgins, inset * v 104-91; hydr., N. Y. harbor *R Gaz* Aug 28-91; Jandin's hydro-pneu, jointed conduit *Sc Am Sup* * Mar 9-89

The Eng dredging machinery, subaqueous rock, Suez canal, Mar 9; combined traction engine, crane and excav. 30; hopper, Glasgow exhib. Sep 7, 7-88; Wilson's single chain grab * Nov 28-90; hopper, for New So. Wales, inset * Apr 8; sand pump, Thyboron, inset * Sep 16-92. See also under CANALS; HARBOR eng.

Drexel Institute, Phila., Depew *E Mag* Feb -92

Drifting tests, autographic, Goodman *Inst C E* * v 92-88

Drills and drilling, electric mining *El Wld* * Dec 12; Simplex twist-drill grinder *Eng* * Nov 6-91; Ingersoll-Sergeant, air valve *E News* * Sep 27-90; Ainly-Oakes square hole drilling machinery, inset * June 20, inset * 27; Edison elec. percussion, May 16-91 * Aug 25; Schuttler contin. acting ratchet * Oct 6-92; rock, trials, Carbutt, insets (full) *Inst M E* * Mar; Hawksworth stay-bolt *R Gaz* * May 29-91; Edmeston grinding machinery *The Eng* Apr 27-88. See also Rock drills

Driven wells. See WELLS

Dry-docks. See DOCKS, dry-docks, etc.

Drying ap. in vacuo, Passburg *Eng* * June 28-89, insets *Inst M E* * May -89, *Sc Am Sup* * Apr 19-90

Dublin, port and works, Griffith, insets *Inst M E* * July -88

Duluth, Minn., sts., pavements, sewers and drainage *E News* * Feb 14-91

Duncan, Louis, por. *El Wld* * Apr 5-90

Duncan, Robert *The Eng* July 12-89

Duncan, Thomas *Inst C E* v 110-92

Du Port (Bey), William J. *Inst C E* v 106-91

Duodecimals, Halliday *The Eng* Mar 1-89

Dust, (means of excluding) and fresh air, Teale *Pop Sci* June -92; number of particles in atmos., Aitken *Sc Am Sup* Apr 7 -88; atmospheric, Marcet, June 21-90; spectroscopic properties, Liveing * Feb 14-91; McPherson, Jan 2-92; Prinz dust collector *The Eng* May 11-88

Dye-houses, ventilation of *Locom* Dec -88

Dyes and dyeing, a revolution in dyeing, Chase *F Inst* Nov, Dec -90; and photographic printing, diatype proc., Carbutt, June -91; dyes, coal-tar or aniline *Chem Tr J*, *Sc Am Sup* May 9, fast and fugitive, Hummel (full) July 11, 18-91, Jan 30 -92, *Soc Arts Lond*; lactic acid and lactates in textile coloring, Norton *Tech Q* Nov -90. See also CHEMISTRY; COLORS; INDIGO, etc.

Dyewood extracts, notes, Siebold *Sc Am Sup* Aug 17-89

Dynamics, a question of, Dewey, ed. *E News* * June 23-88; dynamic possibilities, ed. Sep 15-92; practical illustrations of, Greenhill *The Eng* Sep 13, 27 * Oct 25 * Nov 8, 22, Dec 6, 20, 27-89, problems in, Jan 31, solution, Apr 4; nomenclature com., Brit. Assoc. pro. Aug 15, 22-90; of gravity, Preston, cor.

Dynamics

Apr 10-**91**. See also PHYSICS, Dynamics, bk., Fessenden, Lond. -**92**

Dynamite shells, ed. *Eng* Nov 16-**88**. See also EXPLOSIVES; GUNNERY and armor

Dynamometers, transmitting, loss in by friction, S. Webber *Am M E* * v 10-**89**; aut. absorption, Alden * v 11 -**90**; belt dyn., Watt v 12 -**91**; measurement of power, Gray, variable speed power transmission, Spaulding * v 13, 13 -**92**, *Iron Age* * Dec 8-**92**

Cassier's power measurement, Gray * June -**92**; Alteneck *El Eng* * May -**88**; *El Rev Lond* * Sep 23-**92**; the Trouvé *El Wld* * July 19-**90**; Heinrich * June 11-**92**

Eng friction brake, Beaumont, Nov 16-**88**, do. Brotherhood registering * June 14-**89**; Amsler's recording * Oct 24-**90**; a belt, Watt * Sep 18-**91**

E News aut. absorption, Alden * June 28-**90**; belt dyn., Watt * June 20-**91**; measurement of power, Gray * May 19-**92**; rough and ready, for small motors, Hoskin *F Inst* June **91**; friction brake, Beaumont, discuss. (full) *Inst C E* * v 95-**89**; aut. registering *Sc Am Sup* * Feb 9-**89**, * *Industries*

The Eng Deprez registering, Feb 17; Smith's rotary transmission, May 11; friction brake, Newcastle engine trials, Anderson, Nov 9-**88**; Murray power transmission * Nov 29-**89**

Dynamos, Dynamo-Machinery, S. P. Thompson, bk., Spon. Lond. '88

El Eng machines, theory, Hopkinson * Jan, diseases, S. P. Thompson, Jan -**88**; shunt wound, influence of position of commutation on output of, Martin * Dec 31-**90**; design, Reid * Feb 4, 11-**91**; management, Crocker, Wheeler * Jan 13, 20 * Feb 3-17 * Mar 9, 16, 30, Apr 27 * May 11, 18; design, Loomis, Mar 16; machinery, theoret. elements, Kennelly * Apr 20, 27 * May 4, 18, 25, June 15, Nov 30, Hopkinson * May 11; genesis, Pacinotti, por. * Sep 21, 28 * Oct 5, 12-**92**

El Rev Lond machines, synthetic study (full) * Aug 3, 10, 24, Sep 7, 21 * Oct 5, 19 * Nov 2, 16, 23 * Dec 7, 21-**88** * Jan 11, 25, Feb 15 * Mar 1, 15 * Apr 5, 19 * July 5, 19 * Sep 6 * Oct 4-**89** * Jan 31 * Feb 14 * Apr 4, May 2, 16, June 6 * July 11, Aug 22, Sep 26, Nov 7, Dec 26-**90**; Paris exhib. * July 12, 26 * Aug 2, 9, 23 * Sep 6, 13 * Oct 11-**89**; machines, Minet, Feb 7, 14; and motor design, Esson * 28 * Mar 7, 14-**90**; Blackburn

Dynamos

* Jan 30 * Feb 6; choice of a dynamo, considerations, Roberts, Oct 30, Nov 6; Frankfort exhib. * Oct * Nov * Dec -91; machinery, Hopkinson * Apr 15; waste field of, expts., Puffer * 15; relative weights and costs, Snell * May 20; calcs. and designing chart, do. * June 3-92

El Rev Knowles * July 20 -89; machines and motors imp., Swinburne * Apr 19; control of and coupling, do. Sep 6, 13-90, *Industries*

El Wld and motors, cal. and designing, Crocker * Apr 28; machines construction, Poole, June 30; and motors designing, Owens * Nov 17-88; machines, Hillairet, Sep 7-89; and motor design, Esson (full) * Mar 22, 29 * Apr 5, 12; best speed, Rechniewski * Sep 13, new forms, Wadsworth * 13-90; choice of a dynamo, Roberts, Oct 17-91; and motors, magnetic leakage, Ives (full) * Jan 2; effc. determinations, Kapp * Feb 20; dynamo-elec. machinery, Hopkinson, Wilson * Apr 30; relative costs and wts., Hering * 30; and motor cal., Bedell, diag. * 30; heat radiation from, Rechniewski, May 14; relative wts. and cost, Snell * June 25; effc. diag., Hering * Aug 13; designing, Picou, Nov 5-92

Eng Paris exhib. * Sep 6; Desrosier, do. * Oct 18-89; early * July 10-91; and motor cal., Bedell, inset *F Inst* * June -92; 1000 h.p. steam, Berlin Cen. elec. light station, Uppenborn, abs. *Inst C E* v 100 -90, *Elek Zeit* v 5 -90; Cail Soc. abs. *Inst C E* v 106-91, * *Genie Civil* v 19 -91; designing, Hobart *Pwr* * Oct * Nov -89 * Feb - * Apr * June - * Sep -90 * Feb, Mar -91; development, Fairchild * Apr * May -90; losses in, Hobart * May -91; diseases of, S. P. Thompson *Sc Am Sup* Jan 7-88; waste field of, experimental study, Puffer *Tech Q* * Oct -91; speculations on electro-magnetism, Fritsche *The Eng* * June 21; Alioth, Paris exhib. July 12-89. See also

ELECTRIC generators — motors

ACCESSORIES, dynamo room, for resist. measurements, etc., Has-
kins *El Rev Lond* * Sep 6 *El Rev* * Aug 17 *El Wld* * 17-89

ADMIRALTY specifications *El Rev* May 3-90

AIR gap, relation of, and shape of poles to performance of, Ryan
El Eng * Sep 30 * Oct 7, (full) *El Rev* * Oct 3, (full) *El Wld*
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ALTERNATING current, arc, analyzing magnetic reactions of arm-
atures, Reid *El Eng* * Nov 5; Stanley arc, Tobey * Nov 5, do.

Dynamos, ALTERNATING

- investigation (full) *El Rev* * Nov 8, do. *El Wld* * Nov 8-**90**; Kennedy *El Rev Lond* * June 1-15, 29-**88**; * May 17-**89**; curves showing performance, Lewis *El Wld* * Nov 14-**91**; machinery, Kapp *Eng* Feb 22, May 31-**89**, do. and discuss. (full) *Inst C E* * v 97-**89**; generators and receivers, Anthony *Soc Arts Mass* -**88**
- AMPERE-foot table for cal., and motor windings, Serrell *El Eng* Dec 10-**90**
- ARC, open coil, M. E. Thompson *El Eng* * May 27, (full) *El Rev Lond* * June 19, *El Rev* * June 6, discuss. 13, *El Wld* * May 30-**91**. See also DYNAMOS, alt. current
- ARMATURE reactions and motors, theory, Swinburne *El Rev Lond* * Feb 14, 21, discuss. Mar 28, Apr 4, *El Rev* * Mar 15-**90**; ring, relative proportions of, Dobbie *El Wld* * Jan 26; methods to determine equiv. area of, Ferry, Aug 31-**89**; reaction in constant current, Carhart (full) * June 6; reactions, Wagner * Aug 22-**91**, *Technic*
- BALL, manuf., Collins *El Eng* * Nov 30-**92**
- BROWN'S, transmiss. of power by *Eng* * Apr 20-**88**
- BRUSH alt. current system *El Eng* * Aug, *El Rev* * July 13; arc, effic. etc., Melbourne exhib. lighting, Murray *El Rev Lond* Nov 15-29-**89**
- COMPOUND winding, theory of for constant poten., Bell *El Eng* Nov 26, *El Rev* * Nov 29-**90**; patents (full) *El Rev Lond* Nov 30, Dec 7-28-**88**, Mar 1-15, May 31, June 7, 14, July 5-**89**, machines, July 25-**90**
- CONTINUOUS current machines design, Jamieson (full) *El Rev Lond* * Mar 8-**89**, *Inst C E*
- DESROZIER'S disk-dynamo, Meylan, abs. *Inst C E* v 95-**89**, *Lum Elec* v 29-**88**
- EVANS friction cone direct driving system (theory) *El Eng* * Mar 25-**91**; *El Rev* * Sep 14, belt *El Wld* * Sep 14-**89**
- EDISON, and motor *El Rev Lond* * Aug 21-**91**; *Sc Am Sup* * Mar 5-**92**; Paris exhib. *The Eng* * Nov 15-**89**
- EICKEMEYER'S *El Eng* * Mar -**88**
- FERRANTI system, Haskins *El Rev* Feb 28-**91**; 10,000- light, Grosvenor gallery, Lond. *Sc Am Sup* * Dec 15-**88**; *The Eng* * Nov 1-**89**
- FIELD-magnet coils for, Kapp *El Wld* May 3-**90**
- FRITSCHÉ wheel *El Rev* * Apr 6, n *Sc Am Sup* * Apr 20-**89**

DYNAMOS, GANZ contin. current, Delta type *El Rev Lond* * Dec 14-**88**; alt. machine and transformer, Forbes *El Wld* * May 25-**89**

GOOLDEN-Willans combination, tests *El Wld* * Dec 6-**90**, *Electrician Lond*

HOCHHAUSEN arc light machine *El Eng* * Apr 23-**90**

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LEEDS, the *The Eng* May 25-**88**

MORDEY alt. current *Eng* * June 1-**88**

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OERLIKON three phase alt. current *El Rev Lond* * Aug 28-**91**

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PLATING, Hopkin's *Sc Am Sup* * Mar 14-**91**

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PYLE aut. steam engine and (multiple cyl.) n *El Wld* * Aug 29-**91**

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ASSOC., Nat. pro. (full) *El Eng* Sep -**88**, Sep -**89**, (full) Mar, Mar, Aug 27-**90**, Feb 25, Montreal (full) Sep 16-**91**, Huntley addr. Mar 2-**92**, (full) *El Rev* Sep 8-**88**, (full) Mar 2, Niag. Falls, Aug 17-**89**, (full) Feb 22, Aug 30-**90**, (very full) Feb 28, Montreal, pors. * Sep 5, 19-**91**, pors. * Feb 20, (full) Mar 5-**92**, (full) *El Wld* Mar 3, Sep 8-**88**, (full) Mar 2, Aug 17-**89**, Kansas C. (very full) Feb 22, pors. * Aug 30-**90**, Pres. addr. (full) Feb 28, Montreal (very full) Sep 5-19-**91**, general hist. review, pors. (full) * Feb 27, Mar 5-**92**, *Sci Am* Mar 9-**89**, Prov. *St R J* Mar -**91**

Electric LIGHTING, BALL system *Sci Am* Feb 9-89BANGOR, Me., Brush munic. plant *El Wld* June 29-89BERLIN *El Rev Lond* July 19, 26-89; Kaiser gallerie *The Eng* Sep 21-88BOSTON, Edison station (full) *El Eng* * Aug 10-92BRADFORD, map *El Rev Lond* * June 10-92BRIGHTON, Crompton report *El Rev Lond* Mar 7-90BROOKLINE Gas Light Co., Mass., station *El Eng* * Mar 16-92BROOKLYN, N. Y., Edison station, development, Field *El Eng* * Mar, *El Rev* * Mar 1, *El Wld* * Feb 22-90, (full) * Dec 21-89BRUSH-Swan station effc. test, Bedell *El Wld* Sep 10-92BUOYS, N. Y. harbor (cables) *El Rev* * Mar 12-92CAMBRIDGE, England, station (full) *Eng* * Nov 4-92CANCE system *Eng* July 19-89CHELSEA, England, distrib. with accums., Webber (full) *El Rev Lond* * Oct 4-89CHICAGO, Ill., Wash. Park, Scheffler *El Eng* * Nov 30-92; *Eng* * June 19-91CINCINNATI, O., Hickenlooper station (working plan and el.) *El Wld* * Aug 24-89CLINTON, Mass. station *El Eng* * May 20-91CONDENSERS, future of, Swinburne *El Eng* * Jan 6; spark and air jet expts., E. Thomson * Feb 24-92. See also ELEC. condensersDEPTFORD, Ferranti mains *El Eng* * July 9-90; alt. system *El Wld* * Dec 8-88DOMESTIC, O'Keenan primary applic. to, Shedlock *El Wld* * July 7-88; plant test, Segundo, July 12-90, *Industries*. See also ELEC. Lamps, incand. — lighting, incand.DUBLIN station *El Rev Lond* * Sep 16-92; *The Eng* Oct 2-91EASTON system *El Wld* * Nov 30-89EDISON, pat. suit in England (full) *El Eng* June- Sep -88; station test, Hill (full) *El Rev Lond* Dec 21, 28-88; and Swan United Co. report, Aug 2-89, Aug 1-90, July 22; feeder and main pat. hearing, Aug 5-92; Edison Illum. Co's pro. *El Rev* Aug 24, *El Wld* Aug 24; Canada decis. (full) Mar 23-89; and Swan pats., legal decis. *The Eng* Dec 21-88; three-wire central station system * Nov 15, 22-89. See also ELEC. Co's, Edison; ELEC. lamps, incand, etc.

Electric LIGHTING, EIFFEL tower plant *Eng* * June 21, (full) *Sc Am Sup* * July 27-**89**

EMS, Imhoff, abs. *Inst C E* v 92 -**88**, *Central Elek* -**87**

ENGINES, high and low speed, Powers *El Eng* * July -**88** ; Edison direct connected trip-expan. and generator * Apr 29-**91** ; high speed in, Thurston *El Rev Lond* Aug 29, *El Wld* Aug 9-**90** ; independent engines for incand. stations, Church * Mar 3, *El Rev* Feb 25-**88** ; 1000 h.p., Berlin, inset *The Eng* * Apr 11, 11-**90**. See also ELEC. light stations ; ENGINES

FERRANTI system, Haskins *El Eng* Feb 25, *El Wld* Feb 28 -**91**

FRANKFORT-on-Main *El Rev Lond* Feb 28 * Mar 7-21-**90** ; exhib. May 29-**91** ; report, abs. *Inst C E* v 100 -**90**, *Elek Zeit* v 5 -**90** ; station, Miller report *The Eng* * Sep 30-**92**

GENEVA, Chavannes, abs. *Inst C E* v 95 -**89**, *Lum Elec* v 29 -**88**

HANOVER, Kohlrausch, report, abs. *Inst C E* v 100 -**90**, *Elek Zeit* v 5 -**90**

INCANDESCENT stations, independent engines for, Church *El Rev Lond* * Apr 13-**88** ; prog. Böhm * Oct 9, 16, (full) *El Wld* * Sep 12-**91** ; Ottawa, Ill. Valley plant, long dist., map *E News* * Oct 5-**89** ; carbon filaments, Fitz-Gerald, n *The Eng* May 18-**88** ; Adelphi theatre plant, Edison-Swan Co. * Jan 25-**89**. See also ELEC. lighting, London, etc. — stations

KESWICK water-power station, Fawcus *Eng* May 30, and discuss., inset *Inst C E* * v 102 -**90**

LIVERPOOL stations *El Rev Lond* Jan 30-**91** ; license *E Rec* Sep 22, Oct 13, 27-**88**

LONDON *El Rev Lond* May, June 14, schemes, July, Aug -**89** ; prog., Bailey (full) Dec 19-**90** ; Elec. Supply Corp. report, Apr 1-**92** ; prog., Bailey *El Wld* Jan 10-**91** ; ed. *Eng* May 24-**89** ; Pruden. Assur. Co. offices station * Feb 14-**90** ; Naval exhib. * Nov 27 * Dec 11-25-**91** * Jan 1, 8-**92** ; Lond. Supply Corp., Deptford *E & Min* Nov 10-**88** ; *E News* July 4-**91** ; Lond. Cen. station, Gilley *Soc Arts Mass* -**90**

The Eng Deptford incand. station, Lond. Elec. Supply Co. Oct 26-**88** * Apr 5, 12 * May 31 ; Kensington incand. station. House to House Elec. Sup. Co. * Feb 8-**89** ; * Sep 5, 12 * Oct 24 * Nov 7 * Dec 5, 12, 26-**90** ; Met. Sup. Co., map * Jan 16, 16 * 23 * Mar 6, Scotland Yard * May 8-**91** ; St.

Electric LIGHTING, London

- Pancras station, Regent's Park * Feb 19, 26; Notting Hill * Apr 15; Westminster Sup. Co. * May 13; * Sep 9-92
- LOOMIS system *E News* * May 18-89
- LOWELL light and power station, Shaw *El Eng* * Jan 14-91
- MASSACHUSETTS statistics *El Wld* Mar 26-92
- MELBOURNE exhibition, Murray *El Rev Lond* Nov 15-89
- MOLDINGS, inset *El Eng* * Sep 10-90
- MOTORS, trials *El Rev Lond* Feb 22, report *Eng* * Feb 22 * Mar 1-15, *F Inst* May -89, *J Soc Arts*
- MUNICIPAL, Francisco *El Rev* Aug 30, *El Wld* Aug 30-90; Bangor, Me., plant, Brush, June 29-89; St. Louis 'Munic.' arc system, Ayer (full) Sep 19; by munic. authorities, H. Robinson *E News* Sep 12-91
- NATICK, Mass., station *El Eng* * Aug 6-90
- NEWCASTLE-on-Tyne Elec. Sup. Co. station, Heaviside *El Rev Lond* Oct 28-92
- NEW YORK City, Edison 26th st. station, (full) *El Wld* * Jan 19-89; Madison Sq. Garden, Sullivan * Nov 14-91; * Jan 2-92
- OXFORD station (full) *El Rev Lond* * July 8, *The Eng* * July 1-92
- PARIS, exhib. '89 *El Rev Lond* Mar 29-89, Mar 21, 28, Apr 4, May 16, 23, 30-90; Sector of Place Clichy works * May * June 5-91; exhib., Heister system *El Wld* * Aug 24-89
- Eng* Palais Royal Edison station * Mar 8; exhib. * May 3, portable military plant, July 19, Oerlikon plant, 26, * Nov 15, 22-89
- Inst C E* Paris markets, Andra, abs. v 100 -90, *Genie Civil* * v 16 -89; station, Meyer, abs. *Inst C E* v 105 -91, *An Ponts* v 12 -90; Nansouty, abs. *Inst C E* v 108 -92, *Genie Civil* * v 20 -91; exhib., Fontaine *Sc Am Sup* * May 25 * Aug 17, Gramme station * Oct 19-89; Boul. Rich works, Lenoir * Jan 2-92
- The Eng* Paris exhib. * May 3-31 Oerlikon works * June 14, 21, T-H system * 28, station, July 26, Soc. Gramme do. Sep 20-89
- PHILADELPHIA, Edison station *El Eng* * Oct 8-90, *Pwr* * May -89
- PORTABLE plant *Eng* * Feb 10-88; light port. military, Paris exhib. July 19-89, do. Charlesworth *Sci Am* Nov 17-88, do. ap., Suez canal *The Eng* Oct 12-88

Electric LIGHTING, PROVIDENCE, R. I., Narragansett Co. station
El Eng * Sep, (full) *El Rev* sup. * Aug 17, Henthorn (full)
El Wld * Aug 17, *Pwr* * Oct -**89**, *St R J* * Aug -**90**

REGULATIONS, light and power service rules, Columbian exhib.
El Eng Dec 28-**92**; station, safety *El Rev Lond* Jan 11-**89**; acts 1882 and 1888, Jan 10; (full) Oct 17-**90**; rules for work, Benjamin *El Rev* May 10; and motive power, for install. of, Boston Manuf'rs Mut. Ins. Co. Aug 23, do. *E News* Aug 9; ins. rules, com. report *El Rev* Aug 30, Sep 27, Jenks, 27, N. E. Ins. Exchange, Nov 8-**90**, do. *El Wld* Apr 21-**88**; rules, com. report, Sep 19-**91**; rules, for safe install. *E News* Aug 9-**90**, Oct 3-**91**; rules for *E Rec* Aug 16-**90**. See also ELEC. insurance regs.

ROPE gear for elec. light work, Booth, Lea *El Rev Lond* June 26-**91**

RULES. See ELECTRIC lighting regulations

SAFETY devices E. Thomson *El Eng* Mar, *El Wld* Feb 22-**90**; station safety regs. *El Rev Lond* Jan 11-**89**. See also ELEC. lighting regs.

ST. Brieux *El Wld* * May 16-**91**, *El Rev Lond*

ST. Catherine's Point light-house, most powerful light in world
Sc Am Sup * July 21-**88**, *The Eng*

ST. Louis 'Munic.' arc system and station (largest in world) *El Rev Lond* Jan 16, report (full) *El Wld* Jan 3, Ayer (full) Sep 19-**91**

ST. Paul Gas Co. station *El Wld* * Feb 23-**89**

SALEM, Mass., T-H station *El Rev* * June 15, (plans) *El Wld* * June 15-**89** * Mar 15-**90** * Feb 14-**91**

SOPHIA City *El Rev Lond* June 17-**92**

SPERRY system *El Wld* * June 15-**89**

SPOKANE Falls station *El Wld* * Sep 13-**90**

STATIONS *Am C E* Edison incand., test of, Hill, and discuss. v 18 -**88**; *Cassier's* speed reg. of engines, Aldrich, May -**92**
El Eng incand., independent engines for, Church, Mar -**88**; stats., U. S. Aug 20; value of detail in, DeCamp * 27-**90**; distrib. of steam from, Prentiss * Feb 25; central, management and finance. Foster, Apr 22, 29, May 6-20, June 3-24, July; op. by water power, Redman, Sep 16-**91**; fly-wheel accidents, Emery, Feb 10, 17; effic. and higher econ., Vail, Nov 23, 30, Dec 7; light and railroad plants op. from same station, M Cay, Dec 28-**92**

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Electric LIGHTING STATIONS

El Rev Lond independent engines for, Church * Apr 13; transformers vs. accums., Crompton * Apr 20, 27, May 4; breakdowns, R. J. Jones * June 22; cost, Fritsche * Aug 31-88; cen., notes, Yeaman, Nov 21-90; materials * Mar 13; combining contin. and alt. cur. systems, Leonard, Oct 2, 9; how to get paying loads for, Marks, Dec 4-91

El Rev construction, Woodbury * Feb 22; econom. steam gen., Babcock, Mar 1; accounts system, T. C. Smith, Mar 1; insurance, Barton, May 31, July 19-90; building, Berlin Iron Bridge Co. * Jan 10; steam distrib. from, Prentiss * Feb 28; accounts, uniformity in method, Burleigh, sup. Sep 19; cen., op. by water power, Redman, 19; how to get paying loads for, Marks, Nov 21-91; and power, Mackie, July 23, 30, Aug 13, 20, Sep 10-24, Oct 8, Nov 5, 12-92

El Wld accounts, T. C. Smith, Feb 22; Woodbury * 22; value of details in, DeCamp, Aug 30; as an investment, Sunny, Oct 25-90; steam distrib. from, Prentiss * Feb 28; uniformity in accounts, Burleigh, Sep 19; op. by water power, Redman, 19; how to get paying loads for, Marks, Nov 21-91; the lamp, manager and customer, Roberts * Mar 19; load curves * Feb 27-92, * *Electrician Lond*

E News Keswick, England, water power, inset * Sep 13-90; op. by water power *E Rec* Oct 10-91; running *Pwr* * Sep - Dec -90 * Jan - Mar * Sep * Nov -91; hazards, Low *Sc Am Sup* Apr 9-92; stats. *St RJ* Sep -90; Soc. L'Eclairage Elec., France *The Eng* * Nov 1-89; U. S., Addenbrooke, Jan 10, 24, 31-90; arc station management, June 24-92. See also ELEC. lighting, names of places

SUEZ canal, Sellon *El Rev Lond* * Sep 14-88

TAMWORTH, New So. Wales, Dymond *Inst C E* * v 108 -92

TESLA's system with curs. of high frequency *El Rev Lond* *

July 17, *El Rev* * July 4-91

TIVOLI station *El Rev Lond* * July 15-92

TOPEKA, Kan., Kingman, discuss. *Am C E* v 26 -92

VENICE station *Eng* * Aug 14-91

WASHINGTON, U. S. Navy Yard, Brush arc station, Wilkes *El Eng* * May 21-90

WESTINGHOUSE alt. arc system *El Eng* * Apr 2-90; (full) *El Rev* and sup. * Oct 27, alt. stations (list) Nov 10-88; *Eng* * Feb 8, 22 * Mar 15-89; abs. *Inst C E* v 101 -90

Electric LIGHTING, WESTMINSTER Elec. Light Co. station *El Rev Lond* * Mar 18-**92**

WIRING leads cal., graphic method, Hering *El Eng* * May 27-**91**. See also ELEC. wires

WORCESTER, Mass. station, Shaw *El Eng* * Dec 10-**90**

LOAD equalizer, Mailloux *El Rev Lond* * Dec 26-**90**

LOCK, electro-mag. permutation, Sedgwick's *El Rev* * Sep 28-**89**

LOCOMOTION, Edison pat. *El Rev* * Oct 4-**90**

LOCOMOTIVES, Dobbie's gearless *El Eng* * June 10; Eickemeyer's gearless *El Rev* * June 13-**91**; proposed, Pellissier *El Wld* * Aug 6; tests, Siemens * 27-**92**; ed. *The Eng* June 13-**90**

LOG *El Rev Lond* * Jan 30-**91**

MACHINES, Wimbhurst influence, Darke, cor. *Eng* * Feb 14-**90**, theory, Pellissier *Sc Am Sup* * Nov 14-**91**. See also ELEC. influence machine; DYNAMOS; ELEC. motors

MAGNETIC susceptibilities of various iron and steel, Niegbaur *El Eng* * Feb -**90**; reluctance, Kennelly (full) * Nov 4-**91**; propagation, E. Thomson, Wightmann *El Rev Lond* * Oct 26, do. *El Wld* * Oct 27-**88**; screening, variational, W. Thomson * May 9, do. *El Rev Lond* May 1-**91**; leakage, Ives * Jan 22, 29; balance, Du.Bois * Sep 2, do. *El Wld* * Sep 24-**92**; non-magnetic balances and alloys, Haswell, Webb *El Rev* June 23-**88**; field, change of form affecting, Dolbear. Mar 21-**91**; permeabilities of irons, Thompson * July 2-**92**; call and integr. graph, the Abdank *El Wld* * Nov 24-**88**; Eickemeyer's gauge * Nov 9-**89**; mag. circuit notes, Steinmetz, June 4; permeabil. of special irons, M. E. Thompson * 25; viscosity expts., Hopkinson * Oct 1-**92**; field, early conception, Houston *F Inst* Mar -**92**; circuit, theory, Collins *Tech Q* * May -**89**

MAGNETO-motive force and mag. formulas, Emery (full) *El Rev* * Aug 27 * Sep 3-**92**

MAGNETS, permanent, character of steel used for. Preece (full) *El Rev Lond* * Sep 12-**90**

MAGNETISM, relation to induced elec. mo. force and cur.. E. Thomson (full) *El Wld* * June 1, *El Eng* * June -**89**; Hopkinson * Apr 9-30-**90**; twisting, Balch * Sep 14-**92**; in watches, Giles *El Rev Lond* * Oct 26, Gribi *El Rev* June 9, (full) *El Wld* * June 30-**88**; induced. Ewing * Oct 4. 11, *El Rev Lond* * Oct 3-**90**. See also MAGNETISM

Electric MAGNETIZATION, permeabil. of iron at right angles to direction of, Kennelly *El Eng* * June 11, 18-90; curves for, Emery * Dec 28-92; of iron, time-lag in, Ewing (full) *El Rev Lond* * Nov 8-89; changes produced by, in length of iron wires, Bidwell, Oct 14; of iron, electro-chem. effects, Andrews * Nov 25-92; formulas, Emery (full) *El Rev* * Aug 27 * Sep 3-92; of iron in very strong fields, Ewing *El Wld* Dec 22-88; curves of iron, under alt. curs., Moore * June 4-92; theory and formula for soft iron, Collins *Tech Q* * May -89

MEASUREMENTS, W. Thomson's instrums., Fleming *El Wld* * Feb 25, *El Eng* * May -88, by Weston high resist. voltmeter, Loomis * Dec 24-90, *El Rev Lond* * Jan 9-91; measuring ap. standardizing, Berlin, Aug 9-89; Anthony *El Rev* Jan 21; methods, Liebig, sup. Sep 8-88; wiping contact methods for cur. and poten., Thomas * July 30, *El Wld* * July 2-92; volta-metric of alt. curs., Kennelly * Nov 3; in a house to house supply, Lowrie * 17-88; units and measures, Internat. conference, Paris (full) Sep 21-89; applics. of Weston voltmeters and ammeters, Maschke (full) * Mar 26 * Apr 2-23-92; Lowrie *Eng* Oct 5-88; Webb *E Mag* Oct; instrums., Swinburne *E News* Sep 15-29, (full) *Inst C E* * v 110-92, *The Eng* * May 6-92; as applied to commercial work, Anthony *F Inst* Jan -88; constant shunt method for large contin. curs., Pike * June -92; resist., Bauer *Pwr* * Mar -92

METERS *El Eng* Shallenberger's * Sep -88; Edison chem., Jenks (very full) * Jan -89; the Walker * Apr 9; Wood's * Dec 17-90; the Meylan-Rechniewski energy * Mar 18, Eickemeyer's differential magnetometer, Steinmetz * 25; alt. cur. potentiometer, Moler * May 27-91; Pilkington-White * Apr 13-92

El Rev Lond Geyer-Bristol, for direct and alt. curs. * Dec 21, 28-88; Edison chem., Jenks, Jan 11 * 25, Feb 1, 8; for central stations, Forbes, Feb 1, 8; Cardew recording * Nov 15-89; com. report, Mar 28; Blathy alt. cur. * June 20; Thomson's * Aug 15; W. Thomson's * Oct 10; Mares' energy * Nov 7; Shand, Dec 5-90; Meylan-Rich. energy * Feb 13; Ferranti's * Mar 20; Frere's * 20-91; Brillie energy * Apr 29; Scott's * Dec 16, *The Eng* * Dec 16-92

El Rev for central stations, Forbes, Feb 16; the Slattery * Oct 12-89; Edison electrolytic, Kennelly * Oct 4-90; Walker, May 30, discuss. June 13-91

Electric METERS

El Wld Shallenberger's alt. cur. * Sep 15; Geyer-Bristol, for direct and alt. curs. * Nov 24; Reckenzaun & Pentz's * Dec 29-**88**; Edison chem., Jenks (full) * Jan 5; Nipkow's alt. cur. ammeter * Mar 9; E. Thomson's oscillating * May 4; the Walker * July 20; the Manwaren * Dec 7-**89**; the Walker * Apr 12, May 30, discuss. June 13; Shand, Nov 22-**90**; Perry's elec. supply * July 11-**91**

Inst C E for recording consumpt. of elec. energy, Wordingham, insets (full) * v 108-**92**; Mares' energy, Juppout, abs. v 103-**91**. *Genie Civil* * 17-**90**; Hobart *Pwr* * June-Sep -**89**; the Wood ammeter *Sc Am Sup* * Jan 14-**88**; radiation meter, Gregory * Dec 14-**89**; * Jan 25-**90**; the Frager *The Eng* * May 29; the Teague * June 19-**91**. See also ELEC. ammeters—ohm — secoh — tele — volt — watt meters

MINING machinery, Atkinson *Eng* Feb 13, *E News* * Aug 8; energy transmiss., Leonard and ed. * May 16, Edison elec. percussion drill, 16; Aspen Min. & Smelting Co. * Oct 10-**91**

MOLDINGS, standard for elec. work *El Rev* * Nov 15-**90**

MOTIVE force, thermo-chem. relation to, Siebel *El Eng* July 9-**90**, relations to atomic wt., chem. heat, etc., Gore, *El Rev Lond* June 12-**91**, general relation to equiv. vol., Gore, June 3-24-**92**, constant with variable speed, Hoho *El Wld* * Jan 25-**90**, equation, for resist. and self-induc. circuit, Bedell (full) May 14-28, June 4-**92**; properties of the human heart, Waller * Nov 3, *Sc Am Sup* * Nov 24-**88**, *El Rev*; power, Thorenberg plant *Sci Am* Dec 1-**88**

MOTORS, *Am C E* comparative tests and st. locom., Manhattan eleva. R., Moss, and discuss., insets * v 23 -**90**

El Eng alt. cur., Duncan (full) * Mar, Mar; Liebig, Mar; designing, Walker, May; 2 h.p. Sprague, expts.. Cox * June * Aug; alt. cur. and transformers, new system, Tesla (full) * June, June, Swinburne, Sep; service charges basis, Lufkin, Sep -**88**
El Eng diags., Clarke * Jan; regulation, Crocker * June; and dynamos, Perret * Aug; speed regulation, Deprez on, Paget * Aug; alt. cur. evolution, Patten * Oct -**89**

El Eng Swinburne's alt. cur. * Apr 16; Tesla's alt. * Aug 6; rates basis, Lufkin * 27; Tesla's new alt. Sep. 24; building, Short elec R. system * Oct 15; Bradley's alt. * Nov. 5, self-exciting * 12; windings, Serrell, Dec 10; Riker low speed multipolar contin. cur. * 17-**90**

Electric Motors

El Eng inventors of (Thomas Davenport) Pope (full) * Jan 7-28 * Feb 4; Patten's alt. * Mar 4 * May 13; alt. cur. design, Weston * Apr 1; perfection of stationary, Crocker * May 27; alt. cur., Hospitalier, Aug 26; op. at any speed or torque, with max effic., Leonard * Nov 25; law of max. effic., Mailloux, Dec 9; polyphasal generators, Pupin * 28-91

El Eng the Perret (full) * Jan 6; law of effic., Mailloux, Jan 13; alt. cur., Stanley * Mar 2; gearless, Short * Apr 13; Excelsior, Muldaur * Sep 14; Lundell fan * Dec 7-92

El Rev Lond simple * Apr 13; alt. cur., Tesla's new system * June 15, ed. 22 * 22-88; design, Snell, Feb 1; speed reg., Deprez, Apr 26, *Compt r*; regulation, Crocker *El Rev Lond* * June 14; alt. cur., evolution of new type, Patten (full) * Oct 11-89; armature reactions, theory, Swinburne * Feb 14, 21, Mar 28, Apr 4; op. with high tension curs., Sperry * Feb 21, 28; design, Esson * 28 * Mar 7, 14; Tesla's alt. * Aug 22, Oct 3-90; alt. cur. design, Weston * Apr 17; Hutin & Leblanc's alt. cur. * July 24; Edison's * Aug 21-91; leakage, Ives * Jan 22, 29-92

El Rev Liebig, Feb 25; alt. cur. and transformers, new system, Tesla * June 2, 9, Weyde * July 14; service charges basis, Lufkin, Sep 22-88; Bradley alt. cur. imps. * June 22; alt. cur. Patten * Sep 28-89; armature reactions, theory, Swinburne * Mar 15; imps. do. * Apr 19; Tesla's alt. cur. pats. * Aug 16; rates basis, Lufkin * 30-90; Eikemeyer's novel * Mar 28; Edison small slow speed * May 30; the perfection of stationary, Crocker * June 6; alt. cur., Hospitalier, Sep 12; Bradley's alt. cur. * Oct 2; perfect, Everett, 31; aut. op. at any speed or torque, Leonard * Nov 28-91; alt. cur., Stanley * Mar 12; Ryan series reg. test, Bliss, Dec 31-92, *Sib J Eng*

El Wld the Patten * Jan 7; effic. tests, Crane * Feb 4; alt. cur., Duncan (full) * 25; Liebig, Mar 3; reg., priority of invention, Sprague * Apr 7, 14; cal. and designing, Crocker * 28; alt. cur. and transformers, new system, Tesla * June 2; the Lugo * July 14; service charges, basis for cal., Lufkin * Sep 8; designing, Owens * Nov 17-88

El Wld alt. cur., Tesla, May 25; reg., Crocker (full) * June 1, discuss. * 8; the Perret * Feb 2, July 6 * Aug 3; alt. cur., ev. of new type, Patten (full) * Sep 28; Industries' prize, n * Dec 7; new prin. of constructing, Mailloux * 28-89

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El Wld relation to elec. lighting Co's. Fitzgerald * Feb 1; op. with high tension curs., Sperry, 15; design, Esson (full) * Mar 22, 29 * Apr 5, 12; the Zipernowsky-Deri-Blathy synchronous * Mar 29; Perret multipolar * July 26; alt. cur., new types * Aug 16; Van Depoele induction * 16; rates basis, Lufkin, diags. * 30-90

El Wld work of Dow, in torpedo service, Apr 18; alt. cur., Duncan * May 9, 16; perfection of stationary, Crocker * May 30, discuss. June 6; alt. cur., Hospitalier * Aug 29; Frankfort-Lauffen three-phase, Hering (full) * Oct 31 * Nov 7; aut. op. at any speed or torque, with max. effic., Leonard * Nov 28-91

El Wld magnetic leakage, Ives (full) * Jan 2; alt. cur., Stanley (full) * Mar 5; alt. cur. self starting and exciting synchronous, Patten * Apr 2; cal; Bedell, diag. * 30-92

Eng alt. cur., ed. Nov 20; the Short gearless *E News* * Sep 5-91; in workshops, Jenkin *Inst C E* * v 102-90; small, effic., Clifford, abs. v 91-88, *Am Acad Arts & Sci* v 22-87; *E Rec* * Nov -90; cal., Bedell, inset *F Inst* * June -92

Pwr the Baxter * Dec -88; Thomson's * Jan; reciprocating * Feb -89; Simple * Jan -90; (various) * Jan -92, *Elec Industries*; (growth of business) Pope *R & Eng* Sep -89

Sc Am Sup the Menges thermo-mag, generator * Feb 18; simple, making, Hopkins * Apr 14; charges, basis for cal., Lufkin, Sep 22, Nov 3-88; the Tesla * Apr 6-89; home made, Parkhurst * Aug 2-90; small, Hopkins * Jan 3-91

St R J building, Short R. Co. * Oct -90; max. effic. conditions, Leonard. Mailloux, Jan-92; small, effic., Clifford *Tech Q* Sep -87, Feb 89; small, comparative working expenses of, Korte *The Eng* Jan 22-92, *Zeit deut Ing* -91. See also DYNAMOS; ELEC. generators; RAILROADS, elec. motors

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OHM'S law, extension of elec. mo. force and Oudin *El Eng* Dec 30-91; expt. proof, Mayer * July 9, *El Rev Lond* Aug 1-90; units, the volt, ohm and ampere, Nipher * Apr 27, ohm det., Wuilleumier, July 13-88, suggestions, J. V. Jones (full) Sep 12; the Evershed *El Wld* * Jan 11-90; alt. cur., Swinburne * Dec 19-91; units, ohm, Glazebrook, Jones *Eng* Sep 26-90, new det. of *Sc Am Sup* * Feb 16-89; law and electro-therapeutics, Winton, July 26, expt. proof, Mayer * Aug 2-90, *Am J Sci*. See also ELEC. units

- Electric** OMNIBUS, London *Sc Am Sup* * Mar 2-**89**, *El Eng*
 ORE-dressing, Tilly Foster mine, McDowell *E News* Oct 4-**90**
 ORGAN, control, Hope-Jones *El Rev Lond* Jan 15-**92**; Wacker's
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- STOCKS, English, table *El Rev Lond* Dec 16-92; market *El Wld* Dec 6-27-90
- STORAGE, of the alt. cur., Foppl, abs. *Inst C E* v 102 -90 * *Elek Zeit* -90; storage batteries. See STORAGE bats.
- STORM phenomena *El Eng* * Aug 24-92
- STOVE, Giraud's thermo-elec., Hospitalier, abs. *Inst C E* v 105, 106 -91, *Genie Civil* * v 19 -91, *Sc Am Sup* * July 18 -91. See also ELEC. heating
- STRESS, optical demonstration of, Rücker *Eng* * May 18, *Sc Am Sup* * May 19-88
- SUBWAYS, N. Y. Bd. of Elec. Control, report *El Wld* Jan 12-89, Jan 25; practical working, Maver, discuss. Mar 15-90; of N. Y. City *E News* Apr 21 * May 5, 26; of Phila., cor. * June 9-88; of N. Y. *Sci Am* Apr 20-89. See also ELEC. wires, underground
- SUGAR refining *E News* Sep 22-88
- SUPPLY, cost, Hopkinson *El Rev Lond* Nov 11-92. See also under ELEC. lighting
- SWITCH-boards, Manhattan Elec. L. Co. *El Rev* * May 7; multiple, Baylis, July 9-92
- SWITCHES, designing, Offrell *El Wld* June 21-90; and switching *Pwr* * June * July -91
- TABULATING, Hollerith system, com. report *F Inst* * Apr -90. See also CENSUS counting ap.
- TANNING *El Rev Lond* June 26 * July 3, 10-91, *El Rev* June 14, hist. n *El Wld* Sep 27-90
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- TESTING, Handbook of, Kempe, bk., Spon; of iron, Swinburne *El Wld* * Sep 27-90; ap., construct. and use, Frey * Jan 17-31 * Feb 7-28 * Mar 7, 14-91
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El Rev Lond distrib., Swinburne, Feb 27, Mar 6, 20; effic., Stanley, Mar 6, 13-**91**; relation of size and effic., Stillwell, Apr 22; distrib. by alt. curs., Kennedy, 22, May 6 * 20 * 27; hist. of tension-reducing * May 27; Perry, June 3; tests, Hopkinson report (full) * July 1; effic. at different frequencies, Ayrton, Sumpner * Sep 23, imps. * 23; alt. cur., expts., Fleming (full) * Dec 2-30; Ferranti (full) 30-**92**

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El Wld relation of size and effc., Stillwell, Mar 5; effc., Dobrowolsky * May 28; the Rowland, July 9; Westinghouse 6,500 watt, test, Hopkinson * 16, 23; test of 17,500 watt Stanley, Ryan * Oct 1; effc. at different frequencies, Ayrton, Sumpner * 8, 15; hysteresis measurement in, Evershed * 15, 22; universal, Appolonj * Dec 10; alt. cur. expts., Fleming * 24-92

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Engines, *Am C E* wastes. Thurston * v 23 -**90**; *Am M E* steam consumption at various speeds, Denton-Jacobus * v 19; non-condens., cost of power, Emery * 10-**89**; Hirn & Dwelshauver's theory of. Thurston, v 11; transmiss. of force in, general solution, Jacobus * v 11 -**90**; limitations of economy. Nagle v 13; econ. and effic. of. Peabody, v 13 -**92**; aut. economics of, Thurston *Cassier's* * Nov -**92**; principles and development, Dickerson addr. (full) *El Rev* * Jan 26, Feb 16-**89**

Eng heat in the, Dwelshauvers-Dery, Donkin * July 27; for elec. light, Glasgow exhib. * Aug 3-**88**; theory of the, ed. Mar 29, Apr 12 * May 31, June 21, 28; stationary, Paris exhib. Aug 16-**89**, hor. do., inset * Jan 3; Fairfield works, Govan * Sep 26 * Oct 3, 24 * Nov 21 * Dec 12; small, econ. of, ed. Nov 14-**90**; stationary practice in Am., Stanwood * Jan 2, 16, 30 * Feb 20 * Mar 13 * Apr 17 * May 1, 8, 29 * June 12, 26 * July 10-**91**; Thurston, bk. review, Sep 2; heat distrib. in * Nov 25-**92**

E Mag the prime mover, Iredell * July -**91**; steam and development of power by the steam engine, Isherwood *F Inst* Oct, Nov -**90**; economics of aut., Thurston, insets * Oct -**92**; vel. variations, cyclical, Ransom, inset *Inst C E* * v 98 -**89**; 2000 h.p., Warren, R. I. *Pwr* * June -**89**; new developments in eng., Rockwood, June -**92**; econ. of non-condensing, Wilans, trials *R Gaz* Apr 6-**88**; thermodynamics of, Peabody, bk. review, table, June 26-**89**

Sc Am Sup mod. improvements, S. A. Smith, Mar 17-**88**; the principles and devel., Dickerson * Feb 23-**89**; manage-

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ment * Apr 26; 100 h.p., for elec. lighting, Berlin * May 17-**90**;
the builders of, Thurston, May 16, 23-**91**; theory of *The Eng*
July 6, 20; Nottingham Show, July 13-**88**; Cotterill, bk. re-
view, Dec 26-**90**. See also AMMONIA — ETHER — HOT air —
MARINE — MILL — PETROLEUM — PUMPING — ROAD — ROLL-
ING mill — ROTARY — TRACTION — WINDING — engines; LOCOM.
AIR pumps and condensers, Towler *The Eng* * Apr 29 * May 13
-**92**

AM. high speed *El Rev* * Mar 5, *E & Min* * Mar 5, *Pwr* * Mar
-**92**. See also ENGINES, high speed

BEAM, Whitbread brewery, Boulton & Watt, 1785 *Eng* * July 27
-**88**

BELGIAN, inset *The Eng* * Jan 16, 16-**91**

BRAKE, the Appold, expts. *The Eng* Jan 13, 20-**88**, Dec 2-**87**,
Schönheyder, cor. *Eng* July 28-**76**

BREAKDOWNS, Sweet *Cassier's* Nov -**91**

BURGIN high speed *R & Eng* * Jan -**90**

COLLIERY, econom. use of steam in, McLaren, trials *The Eng*
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Cassier's philos. of multi-cyl., Thurston, Nov; trip-expan.,
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expan. experimental, Peabody * Mar; tandem, New Haven
Elec. L. Co. * Apr; steam distrib. in single-acting, Rites * May;
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El Eng * Sep 28, do. *El Rev* * Oct 15-**92**; Jonson's stationary
(vertical) *El Wld* * Sep 7-**89**; the Triumph * Feb 15-**90**

Eng Guinness grain stores, inset * Feb 3; and non-com-
pound, steam consumption of, trial, Willans, Mar 16; hor.,
Glasgow exhib. * Nov 9; hor., Whitbread brewery, inset * 30-
88; vertical, valve gear * May 31; hor., Sulzer, Paris exhib.
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Feb 14, trip-expan. hor. do. * Apr 4, 11; Lyon's slide valve * May 16; hor., Frikart valve gear, inset * June 20-90; Kaiser-I-Huid cotton mills, Bombay, inset * May 8; trip-expan. experimental, Allis * Aug 14-91; 1600 l. h.p. tandem, inset * Nov 25 -92

E News non-condens., steam consumption of simple and, Williams, May 5; Westinghouse aut. * 5-88; Jonson's balanced * May 4-89; Strong's 250 h.p. trip-expan. vertical * Sep 22; steam distrib. in single-acting, Rites * Oct 20-92

F Inst philos. of, Thurston, Dec -89, of multi-cyl., do. Jan * Feb -90; the Triumph *Pwr* * Mar -90; trip-expan. vertical * Mar -91; Strong's do. * Oct -92; the Woolf *R & Eng* * Apr -88; Willan's trip-expan. * Aug -89, do. central valve *Sc Am Sup* Jan 19-89; quad-expan. mill * Dec -92; Westinghouse *R Gaz* * May 4-88; steam distrib. in, Rites * May 27-92; trip-expan. experimental, Peabody, Hirn's anal. *Tech Q* * Oct -91

The Eng 200 h.p. hor., Crompton, Jan 20; portable self-propelling, Cooper, Apr 27; hor., Glasgow exhib. May 4, 4; trunk air-pump, str. Hector, June 8; a new tandem, Turner, July 20, 20; triple semi-port., Nottingham Show, 27; 800 h.p. tandem, with Proell gear, Sep 7, 7; Willan's trip-expan. central valve, Dec 14-88; 400 h.p. condensing, Brussels exhib. * Feb 22; 350 h.p. Carel's, July 5; trip-expan., with Corliss gear, 26; tandem, Berlin elec. station, Sep 6; the Globe * Nov 29; 400 h.p. Sulzer * Dec 6-89

The Eng trip-expan French, Paris exhib. * Jan 10, 10; Fives-Lille condens., do. * Mar 14, 14; str. Hercules, 1830, inset * Mar 21 * Apr 11, gear * May 2; and trip-expan., ed. 9; Watt's, 1829 * June 27; 250 h.p. vertical * Aug 22, 22; 2000 h.p. condens. * Oct 3-90; trip-expan. vertical condens. for elec. lighting, inset * Feb 6, 6; Corliss mill * Mar 13, 27; 1000 h.p. trip-expan. mill * Aug 7-91; 1000 l. h.p. do. Indian Midland R. * Aug 26-92. See also AIR compressing — BLOWING — MARINE — PUMPING engines, etc.

COMPOUNDING centrif. and load governing by rotary piston valve, Aldrich *Am M E* -92

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CONNECTING rods, Mattes *Am M E* * v 9 -88. See also LOCOMOTIVES, conn. rods

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CRANK pins, method of securing, Collins *Am M E* -88; crank device, Micheles *Eng* * July 10 -91; crank angle for max. vel. of piston * July 15 -92

CYLINDER condensation, of steam in, surface condensers, Whitham *Am M E* -88; effect of steam jacket on, Bird * v 12 -91; thermo-elec. method of studying, Hall *El Eng* * June 24, do. *El Rev Lond* * July 3, do. *El Rev* * June 27, do. *El Wld* * June 20 -91; Conover condenser *El Rev* * July 30 -92; condensers, theory, Dwels-Dery *Eng* Sep 13; action of steam in, expts., English * Nov 8, 15 -89

Inst C E glass ap. for rendering visible effects of, Donkin, abs. v 97 -89; *Bul Soc Mul* -89; heat expenditure, the cyl. heated externally by gas-flames, Donkin, expts., inset, do. Dwels-Dery, Unwin trans. (full) *Inst C E* * v 98 -89; cyl. walls temp. taking at different depths in the metal, Donkin * v 100 -90; thermal action of cyl. walls, Dwels-Dery, abs. v 103 -91, *Bul Soc Mul* Aug, Sep -90; movement of heat in, Kusch, abs. *Inst C E* v 107 -92, *Zeit deut Ing* -91; and re-evap., expts., English, insets (full) *Inst M E* * Oct -89, initial condens., during admission, do. May -92; thermo-elec. method of studying, Hall, *R & Eng* * Feb -92, *Am Inst Elec Engrs*

The Eng ed. Dec 21 -88; theories of, ed. Mar 8; Donkin's co-efficient, ed. 29; and re-evap. in jacketed cyl., expts., English * Nov 8 -89; cyl. walls temp. cal., Donkin, diags. * Sep 25 * Oct 9; thermo-elec. method of studying, Fitz-Gerald * Oct 16 -91; expts., Donkin, ed. July 15; Dwels-Dery, cor. Aug 26, Sep 2 -92

CYLINDERS, proportioning. Thurston *Am M E* v 9 -88; two cyls. vs. multi-cyl. engines, Green & Rockwood -92; deposits anal., Stillman *Cassier's* Nov -92; action of steam in, expts., English *Eng* * Nov 8, 15 -89; expts. on temp. of metal, Donkin, inset *Inst C E* * v 106 -91. See also ENGINES, cyl. condensation

DIRECT connected, Werner *Cassier's* * June - Sep -92

Engines, Dodd's high-speed *Eng* * Oct 5-88

ECLIPSE Corliss, Frick Co. *The Eng* Mar 30-88

EFFICIENCY, the ideal compared with the real, Thurston *E News* * July 4, do. *Am M E* * v 12 -91; and econ. of, Peabody * v 13 -92; Dwels.-Dery *Eng* Feb 21; standard, Bodmer, Mar 7, do. Elliott, cor. 21-90; *Locom* Dec -88; Dery, cor. *The Eng* Oct 25, cor. Nov 1-89; standard of * Feb 7, 21, Mar 14, Apr 25-90

ERIE City aut. cut-off *Pwr* * May, *R & Eng* * May -88

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FISHKILL Corliss, with Cite's releasing valve gear *Pwr* Aug -88 * Aug -90

FLY-wheel, novel, Manning *Am M E* * v 13 -92; and govts., Dwels.-Dery, Donkin *Inst C E* * v 104 -91, do., Ransom, insets * v 109-92; breakage at Amoskeag mills, Manchester, N. H. *Pwr* * Nov * Dec -91

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FRICTION, internal, of non-condensing, Thurston *Am M E* * v 9 -88, abs. *Inst C E* v 92 -88 *E News* May 26-88; speed and work, variable load and internal friction, do. *Am M E* * 10-89, expts. *R Gaz* * Dec 28, (full) *Sc Am Sup* * Oct 27 * Nov 3-88; distrib. of internal, do. *Am M E* v 10 -89 *Eng* * Jan 4-18-89 *F Inst* * Nov, (full) *Sc Am Sup* Nov 10, 17-88; of slide valves, ap. for testing, Aspinall *The Eng* * Mar 22-89

GOVERNORS, J. M. Smith, a use for inertia in shaft govts., Armstrong *Am M E* * v 11 -90, do. *E News* * July 19-90; governing of engines, Aldrich *Cassier's* Sep -92; Wilby supplementary *Eng* * Apr 20-88; action, new method of investigation, Dwelshauvers-Dery, Longridge, trans. *Inst C E* * v 94 -88 * v 110 -92; speed regulators, Marie abs. v 93 -88 *An Mines* * 12 -87; the Westinghouse *R & Eng* * July -91; Tyrel's *The Eng* Dec 28-88; Nadberg's aut. cut-off * Sep 18-91

GRABNER'S, combined piston and valve *E News* * Oct 26-89

HIGH-speed, comparative fuel econ. of, Barius, etc., discuss. *Am M E* v 9-88; high and low speed, Church, Powers *El Rev Lond* Aug 17, *El Eng* Apr 13-88; P. Atkinson *Lehigh Eng J* Feb -89; Rigg's revolving *The Eng* Jan 27-88

HISTORY, early *Cassier's* * Nov -91; 50 years ago, number, etc., ed. *R & Eng* July -88

INDICATOR diagram, Emery *Am M E* * v 9-88; motion device, Jacobi * v 10 -89; rigging for compound engines, Par-

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sons, length of card, Webb, the comparison of indicators, do. * v 11 -90; the Tabor *Eng* * June 7-89; errors of *E News* * Feb 9-89; the Perry * Sep 5-91

Pwr indicating * Aug - Oct -88 * June - Aug * Nov -89, comparison, Webb * Jan, Feb -90; files to * Dec -92; Bagshaw's diagram meter *The Eng* Aug 24-88; the Tabor, July 19; combined diags., Gill, cor. Aug 23, Campbell, 30 * Oct 11-89. See also INDICATORS, continuous, etc.

KIMBLE, the *The Eng* * Oct 2-91 *Pwr*

LIDBACK's vibrating *F Inst* Oct -88

LYON's compound slide valve *Eng* * May 16-90

MC EWEN aut. *El Wld* * Apr 16-92

MOTOR, an alleged new, Lautreppe *E News* Jan 7-88

NOBLE's vertical *The Eng* * June 20-90

PHILADELPHIA Corliss *Pwr* * Jan -92

PISTON packing, new principle in, Sweet *Am M E* * v 9 -88; friction of packing rings, Denton * v 10 -89; rod packings *Pwr* * Jan -88; rod breakages, report *R & Eng* * Nov -90

PORTABLE, with removable fire-box and tubes *Eng* * May 10-89; semi-portable trip-expan. *E News* * Aug 11-88; how erected *The Eng* * Sep 11-91

PYLE aut. and dynamo (multiple cyl.) *El Wld* * Aug 29-91

RIGG's high-speed revolving *The Eng* Jan 27-88

ROBB-Armstrong, n *E & Min* * Sep 10-92

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SLIDE valve diagrams, Thallmayer, cor. *Eng* * Mar 15-89; balanced slide valves, Park, inset *Inst C E* * v 98-89; Ætna balanced *Pwr* * Oct -90; friction of, ap. for testing, Aspinall *The Eng* * Mar 22-89. See also ENGINES, valve gears

SPEED register, Duveau's *Eng* * Sep 27, *Sc Am Sup* * Nov 9-89; regulators, Marie abs. *Inst C E* v 93 -88 *An Mines* v 12 -87; speed and work, Thurston *Am M E* * v 10 -89, expts. *R Gaz* * Dec 28, (full) *Sc Am Sup* * Oct 27 * Nov 3-88; Corliss valves setting *Pwr* * Mar -90 * Nov -92; valves * June -90; Child's piston *R & Eng* * Jan -89; valves, Hawley *Sc Am Sup* * Jan 31 * Feb 14-91. See also ENGINES, governors — high-speed

STEAM jacket, authorities on, Thurston *Am M E* v 12 -91, do. Donkin *Inst C E* v 104 -91; influence of, Kent *Cassier's* * Dec -91; Dwels-Dery *Eng* Dec 13-89; econ., notes from an

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eng. lab. Dec 25-**91** ; value, com. report, Oct 28, Davey, 28, Nov 4, expts. * Dec 9-23-**92**, do. (full) *Inst M E* Oct -**89** ; max. effic., Thurston *F Inst* * Apr -**91** ; effic., ed. *The Eng* Nov 28-**90** ; value, com. report, Oct 28-**92**.

STRAIGHT Line, 100 h. p. *El Wld* * Aug 24-**89**

STRONG's trip-expan. vertical *El Eng* * Sep 28, *El Rev* * Oct 15, 250 h. p. *E News* * Sep 22, *Pwr* * Oct -**92**

SULZER, Brussels exhib. *The Eng* Aug 17-**88**

TESTS and trials *Am M E* of several types, Carpenter * v 11-**90** ; compound trip-expan., Henthorn * v 12 ; applics. of Hirn's anal. to, Carpenter * v 12 -**91** ; testing, Ihlseng *Cassier's* * Apr ; compound multi-cyl., Green * May -**92**

Eng Royal Agric. Soc. at Newcastle, Shaw, cor. * Jan 6 ; steam consump. of compound and non-comp., Willans, Mar 16 ; Highland Soc. Show, Nov 16-**88** ; Soc. of Arts, ed. Mar 29 ; Dulwich College experimental * Nov 1 ; at Whitworth eng. lab. trials, Manchester, Reynolds, Dec 13-**89** ; Sulzer type hor. trip-expan. 200 h. p., Schröter * Dec 5-**90** ; compound, expts., Reynolds *E & Min* * Aug 9-**90**

E News several types, Carpenter, table, Aug 2-**90** ; econ. of non-condensing, simple, compound and triple, Willans, and discuss., insets (very full) *Inst C E* * v 93 -**88**, reply to cor. * v 96, Westinghouse test, Alley, n v 96 -**89** ; at Whitworth eng. lab., Manchester, Reynolds, and discuss., inset (full) * v 99 -**90**

Pwr compound, Howland mill, New Bedford, Mass. (full) * Dec -**89** ; Utica, N. Y. Steam Cotton mills power plant, Carpenter * Aug -**92** ; econ. of non-condens., Willans *R Gaz* Aug 6 -**88** ; expts. at Mass. Inst. Tech., Purinton, general review of tests, Peabody (full) *Soc Arts Mass* -**88** ; Purinton *Tech Q* * Feb -**88**

The Eng econ. of non-condens., Willans Apr 6 ; Highland Agric. Soc. Aug 3-**88** ; Soc. of Arts * Feb 22 * Mar 1, 8-**89** ; Royal Agric. Soc. July 4-**90** ; colliery, econom. use of steam in, McLaren, July 17-**91**

THREE-cylinder, Paris exhib. *Eng* July 12-**89**

UNDERGROUND hauling, Ilkeston colliery *Eng* * Nov 23-**88**

VALVE gears, effect of unbalanced eccen. or gov. ball on valve motion, Sweet *Am M E* * v 11 -**90** ; Proell gear on compound *Cassier's* * Aug -**92**

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hor. engine with Wheelock gear, Paris exhib., inset * Aug 9; Bremmes' * Oct 11; radial gears, J. R. Smith * Nov 22, 29-89; radial gears, Payton, cor. * Jan 24; Bremme's, cor. * 24; Frikart gear, comp. hor., inset * June 20-90; Walker's Corliss, n * July 24-91; the Zenner valve motion diag. Gow *F Inst* Sep -88; prob., graphic solution, Weihe *Lehigh Eng J* Apr -89

Pwr Fishkill Corliss with Cite's releasing gear * Aug -88 * Aug -90; link motion, Lyne * Apr, June -89; Corliss valves setting * Mar -90 * Nov -92; valves * June -90; Child's piston valve *R & Eng* * Jan -89; radial gears, J. R. Smith * Feb * Mar, Morton radial * May -90; valves, Hawley *Sc Am Sup* * Jan 31 * Feb 14-91; Proell gear, 800 h. p. tandem comp. *The Eng* Sep 7, 7-88; the Cross gear * Apr 4-90. See also ENGINES, slide valves.

WESTINGHOUSE aut. compound *E News* * May 5, *R Gaz* * May 4-88

England, taxation, local expenditure, ed. *Eng* July 26-89; trade relations with Am., McCormick, and ed. Apr 8, 29-92; coal-ing stations, defences of, Hong Kong *The Eng* * Jan 18, Singapore * Feb 1, Aden * Mar 15, Cape of Good Hope * Apr 5-89. See also BRITISH; GREAT Britain

English notes *E & Min* Aug 24, 31, Sep 14, 21, Oct 12, Nov. 23-89. See also GREAT Britain

English, Thomas A. *Inst C E* v 97 -89

Engraving rail sections, 4 styles, etc., ed. *E News* * Dec 27-90

Entomology, Riley (full) *Sc Am Sup* Jan 17-31-91

Ericsson, John *Eng* Mar 15-89, Church, bk. review, Feb 13-91, por., inventions, etc., and ed. *E News* * Mar 16-89, *Locom* Apr -89, por. (full) *R & Eng* * Apr -89, life of, Church, bk. review, Jan -91, por. *Sci Am* Mar 16, Capt., and his work, 23-89, MacCord (full) *Sc Am Sup* Feb 8-90, Stevens Indic, ed. *The Eng* Mar 29-89

Esparto. See PAPER. Esparto (fibre)

Estridge, Joseph *Inst C E* v 106 -91

Ether, elec. and ponderable matter, W. Thompson (full) *El Wld* * Apr 27-89; first capital operation, Slade *Scribner's* Oct -92

Ether engine, Susini's *Sc Am Sup* * Nov 14-91

Ethics and railroad supplies *R & Eng* Dec -89

Etna, volcanic eruption *Sc Am Sup* Aug 27-92

Evaporation of moisture from various substances, expts., Worrell, table *Sc Am Sup* July 7-88

Events, current, monthly record *Harper's* files

Evolution *Locom* Aug -89; mental, in man and lower animals, Bodington *Sc Am Sup* Aug 6-92

Ewing, J. A., por. *El Wld* * Jan 17-91

Excavating and excavators, Panama Canal, Willans, insets *Am C E* * v 19 -88; steam, Clements *Am M E* * v 9 -88; methods and cost of working by steam excavs., Clements *E News* * May 26, June 9-88; a great rock excav., Tilly Foster mine, Brewster's station, N. Y. * Apr 20; excavator for sewer trenches * Sep 27-89; and hoisting machinery, the White, Minn. * June 6-91; trenching and pipe laying, Fitz Gerald *E Rec* * June 15; timbering shafts, Croton aqueduct * Aug 17, 31-89; at Panama canal, Nansouty, abs. *Inst C E* v 94 -88 * *Genie Civil* * v 13 -88; Darby broadside steam digger *Sc Am Sup* * Sep 1-88, *Iron*. See also DREDGING; MINING; SEWERAGE; TUNNELING

Executions, methods, n *Locom* Jan -90. See also ELEC. execution

Exhibitions, ethics of great, ed. *Eng* July 4-90. See also ELEC. exhibits.

AGRIC. Soc., Royal, Show, Doncaster *Eng* * June 26; *The Eng* * June 19, 26-91

AM. Institute fair, N. Y. *Sci Am* Oct 20-88

CRYSTAL Palace Elec. *The Eng* * July 22-92

EDINBURGH, 1890 *Eng* inset * Apr 11-25, May 30, June 20 * July 11, 25 * Aug 15, 29 * Sep 19, 26 * Oct 10; *The Eng* Mar 28, buildings * May 2-90

FRANKFORT Elec., plan *Eng* * July 18-90 * May 8, 22, 29 * June 5-July 24 * Aug 7-28, Sep 4 * Nov 13, *The Eng* * Sep 18, 25 * Oct 2-91

GLASGOW Internat. *Eng* Mar 23, plan * Apr 20, May 4, 25, June 8-29, July 13 * Aug 3, 10, Nov 9-88, *The Eng* Nov 18-87, Apr 27, May 11, June 1-88

MOSCOW, French Elec. at *Eng* * Aug 21, 28 * Sep 4, Oct 2-91

NAVAL. Royal, London *Eng* * Feb 13, May 1 * June 5, 12 * July 17-31 * Oct 2-16 * Nov 27 * Dec 11-25, *The Eng* * Mar 13 * May 1-29 * June 5-26 * July 10-31 * Aug 14, 21-91

PARIS, notes *El Wld* Oct 5, 12-89, ed. *Eng* * Apr 27, May 11, inset * June 1, 29. ed. July 27 * Aug 10, 31. ed. Sep 28 * Nov 2-

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30 * Dec 14-**88** * Jan 4, 25 * Feb 1, inset (full) * May 3, ed. 10, 17, 24, * June 7, 7, means of transport * July 5-26 * Aug 2, 16, 23 * Sep 6, 13, 27, awards, Oct 4, 11, stats. 18, ed. Nov 8, 15, Wood, cor. Dec 13-**89**, diplomas * Jan 9-**91**, *E & Min* * May 18 * June 1-**89**, *Genie Civil*, U. S. elec. exhibits, Hering *F Inst* Jan, May, June, metallur. arts at, Garrison, May, June * July, Aug * Oct -**90**; 1889, Machin. Hall erection, Henard, abs. *Inst C E* v 95 -**89** *Genie Civil* * v 13 -**88**, *R Gaz* May 17-**89**, *Sci Am* Feb 2, 2, Apr 20-**89**; 1889 *Sc Am Sup* * Aug 4-**88** * Feb 16 * Mar 30 * Apr 27 * May 25 * June 8, 15 * July 13 * Aug 17 * Oct 12, 26, awards, Nov 2, 9-**89**, *The Eng* Dec 28, 28-**88** * May 3, Eiffel tower * 10, 17, June 14 * Aug 2-16, awards, Oct 4-**89**

TASMANIA *Eng* Feb 6-**91**

U. S., World's Columbian, Chicago, 1893, *Am C E* Gov't building dome ironwork. McGuire, insets (full) * v 26-**92**; *Century* architecture, Van Brunt, May — Aug; Kirkland *Chaut* Dec -**92**

El Eng electricity at, Calkins * Nov 23-**92**; *El Wild* Electric. bld. plan (large scale) * Oct 24 -**91**, electric. at * Aug, Sep, Machin. bld. * Oct 1, electric. at * Dec 3-**92**

Eng Dec 27-**89**, ed. Mar 7, Berger on Chicago, Wood May 2, Berger July 4, Oct 3, Dredge Dec 5, ed. 5, 12 * 19-**90**, Jan 2, ed. Feb 20 * 27, ed. Mar 27 * Apr 17 * May 1, inset 29 * June 5, inset 12, ed. 19, inset 26 * July 10, ed. 17, 24, inset 31, 31, ed. Aug. 7 * Sep 18, n * Oct 9, 23, 30 * Nov 6, inset 13 27, inset * Dec 4, 4, Dredge, inset 11, 11, 18, 18, 25-**91**; * Jan 1, Dredge, inset 8-29 * Feb 5-19 * Mar 4-25, inset * Apr 8-29 * May 6, Gov't. bld. 20, 27 * June 10, 24 * July 1-29 * Aug 5, Dredge, 12, Wood report, 19, 26 * Sep 2, cost of exhibiting, 9, 16, 23 * Oct 28 * Nov 11-25, Transport. bld. * Dec 2, 9, Dredge, Electric. bld. * 16-30, Dredge, 30-**92**

E Mag mechan. display, Atkinson, Apr; buildings, Freitag * Nov -**91**, Manuf's bld., greatest of all fair buildings., do. * July; and death rate of 1893, Bayles, Dec -**92**

E News original buildings, ed. Oct 5-**89**, novel plan, Jennison * Mar 15, ed. 29-**90**, vs. N. Y. City, ed. Aug 10, proposed N. Y. site for, ed. Sep 29-**89**, general plan * Mar 28 Sep * 26, birds-eye view * Oct 31, figures 31-**91** * Jan 16, n 23, 30, buildings, inset * Feb 13 * Mar 5, dome 12, 26, Apr 9 * 21, Mining

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- Grates**. See FURNACES, grates
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Anderson, Oct 9-**91** ; currency commissioners' arguments
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The Eng penetration of ar. plates, cal. of trajectories, May 11, 11; Krupp's projectiles and Brit. steel-faced plates, July 13; French and Ital. ar. tests, Nov 16; Gruson's armored carriages, Schumann, Dec 7, 7; ar. lead tempering, Lisbonne, June 1-**88**, *Genie Civil*

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- ARMSTONG rapid fire *R & Eng* * July -**91**, *Industries*; 110½-ton, for str. Victoria *The Eng* * Mar 28, str. Teutonic * Dec 19-**90**
- BREECH-loading, mechanism for 10-in. *Eng* * June 10-**92**; 12-in army rifled *R & Eng* * Sep -**91**, *Iron Age*
- BOFORS cast steel, Michaelis *Am Min* v 16 -**88**, *Sc Am Sup* Sep 15-**88**
- BROWN segmental wire-wound *E News* * Nov 24-**92**, *Sc Am Sup* * Jan 11-**90**, Wittman * Dec 24, *The Eng* * Nov 11-**92**, *Am Min*
- CANET quick firing, with elec. training gear *El Rev* * Sep 27-**90**; 66-ton, test *Eng* Feb 27, Sep 4; vs. Krupp, Dec 25-**91**, Jan 1, 15-29, Feb 5, Apr 1, May 20, June 3, 10-**92**; large, for Japan *E News* * Jan 30; and ar. trials *Sc Am Sup* * Jan 16, 16-**92**; *The Eng* * June 12 * Dec 11-**91**
- CANNON, mod. high power rifled, development, Califf (full) *R & Eng* * Jan * Feb, Apr — * Oct -**89**
- COLT's navy revolver, com. report *F Inst* * May -**90**
- DRIGGS-Schroeder quick firing *Eng* * Oct 28-**92**
- DYNAMITE, development, Batcheller *E Mag* * Sep -**91**; 15-in., trial *Sci Am* Feb 16-**89**; Zalinski pneu. *Sc Am Sup* * May 12; pneu., Haig * Mar 10, do. *The Eng* Feb 3, Zalinski, 17-**88**; U. S. navy report, Mar 29-**89**; the Graydon * Jan 30-**91**; pneu. sea-coast (full) * June 10, 10-**92**
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- FACTORIES, of Forges and Chantiers, Havre (full) *Sc Am Sup* * June 21-**90**; Royal ordnance, constitution of, Great Britain, Anderson *The Eng* Oct 9-**91**
- FIELD, and mountain, Armstrong *Eng* * Dec 6-**89**; Russian field and coast *Sc Am Sup* * Sep 1-**88**, *The Eng*
- FRENCH artillery, insets (full) *Eng* * Jan 3-**90** — Apr 24-**91**; quick firing, ed. Aug 12-**92**; mod. *Sc Am Sup* * July 19-**90**
- GERMAN magazine rifle *Eng* * May 15, new *Sc Am Sup* * Jan 3-**91**
- GIFFORD liquid-gas *E News* * Aug 9, carb. acid *Sc Am Sup* * Aug 30-**90**
- GRUSON's quick fire *R & Eng* * Apr, *The Eng* * Jan 10-**90**

- Guns, HOTCHKISS ordnance *Sc Am Sup* * July 13-**89**, revolving cannon * Mar 7-**91**, *Eng*; Paris exhib. *The Eng* * June 7-**89**
- HOWITZER, 11-in., Armstrong *Eng* * Jan 6-**88**; cast iron, Spain * Mar 11-**92**; high angle battery *The Eng* * July 18-**90**
- KRAG-Jorgensen repeating rifle *E News* * Oct 6, *R & Eng* * Oct -**92**
- LEBEL magazine rifle *Sci Am* Oct 27, *The Eng* Sep 28, 28-**88**
- LONGRIDGE, the *Eng* * May 4, 11, *The Eng* May 11-**88**
- MACHINE, Miller's aut. indicator for *Sci Am* Mar 9-**89**
- MAGAZINE rifles, rifle-mark, ed. *Eng* * Feb 6; the Mannlicher (our new) * Mar 6; the Mauser * Apr 3; Swiss * Oct 2; Rees' * Nov 27-**91**; new *Sc Am Sup* Apr 5-**90**; mag. guns development, A. Russell * *Soc Arts Mass* -**90**; *The Eng* * Apr 4-**90**; new * Feb 6; small arms, tests, N. Y. * Sep 4-**91**
- MAXIM aut. machine, inset *Eng* * Jan 27; 3-pounder * June 22-**88**; * Oct 9, 16-**91**; *Sci Am* Feb 16-**89**; *Sc Am Sup* * July 7, *The Eng* June 1-**88**
- MORTARS, U. S. cast iron coast *Eng* * Mar 18, 25 * Apr 1-22, do. 12-in. breach-loading rifled *E News* * Dec 8, *R & Eng* * Dec -**92**; 12-in. manuf., Fuller, Connet *Sc Am Sup* * Sep 6-**90** * Jan 17-**91**, *Steven's Indic*; 12-in. rifled, S. Mansfield *Soc Arts Mass* -**91**; mod. breech-loading rifled construct., A. Russell *Tech Q* * Apr -**92**; Whitworth mounting for high angle fire *The Eng* * July 24-**91**; U. S. breech-loading * Dec 9-**92**
- MOUNTINGS, strs. Devastation and Rupert *The Eng* * Apr 24 -**91**
- NORDENFELT, disappearing turrets for *Eng* * Oct 30-**91**; light quick fire batteries *The Eng* Jan 20, Feb 24-**88**
- PNEU., torpedo, Zalinski *Eng* July 12-**89**, do. *R & Eng* * May -**88**; *Sc Am Sup* * Oct 12; the Dudley *The Eng* Sep 6-**89**
- QUICK firing, rapid firing, Kimball *Eng* Jan 13, Feb 10, 24, Aug Aug 24-**88**; ed. Sep 30, Oct 7-**92**. See also GUNS, Drigg's—Gruson—Nordenfelt—Schneider, etc.
- RIFLES of mod. armies *R & Eng* Jan -**88**; military rifle development, Califf * Jan * Feb -**89**, do., reduction of calibre in, Dunn *Sc Am Sup* Dec 22-**88**
- RUSSIAN artillery in 1888 *The Eng* July 27-**88**
- SANSFARREIL, the *The Eng* * Feb 6-**91**
- SCHNEIDER quick-firing *Eng* * Sep 16-**92**
- SMALL arms manuf., Rigby *Eng* Dec 2, *Inst C E*, *The Eng* Dec 2-**92**; magazine, tests, N. Y. * Sep 4-**91**

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Gutta-percha *El Rev Lond* Nov 21, Dec 5-26-**90**, Jan 2, expts.

Mar 6, supply, n Oct 23-**91**, do., Serullas, May 20-**92**, future supply, do. *Sc Am Sup* Nov 5-**92**

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Gyroscopes, Jansen, cor. *The Eng* * Sep 30-**92**

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Hackney, William *Inst C E* v 100 -**90**

Haghe, Augustus *Inst C E* v 101 -**90**

Hall, Richard T. *Inst C E* v 99 -**90**

Hall, William J. *Inst C E* v 102 -**90**

Hallauer, Octave-René, Hirn *The Eng* June 13-**90**

Hamand, Arthur S. *Inst C E* v 97 -**89**

Hamill, Edward D. *Inst C E* v 109 -**92**

Hamilton, George A., por. *El Wld* * May 11-**89**

Hammers, Thwaite's suspen. pneu. power *Eng* * Mar 13-**91**; aut., the MacCoy pneu. tool *E News* * July 27-**89**; and rams, Jameson *R & Eng* Oct -**89**; the Longworth power * Aug -**92**, *The Eng*; pneu. *Sc Am Sup* * Apr 25-**91**; blows, force of, *The Eng* Aug 30-**89**. See also STEAM hammers

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Hancox, Joseph *Inst C E* v 99 -**90**

Hand-writing, elec. transmitting, Gump * *Soc Arts Mass* -**89**

Hanna, Francis B. *Inst C E* v 102 -**92**

Hanscom, William W. *Am M E* -**88**

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E News physical phenom. of entrances, Haupt * Feb 25-**88**; excav. under water, cost, table, U. S. Eng'r. Dept., Jan 5; submarine excav. in sand, Ter-Meulen excavator * Mar 23-**89**; double sextant for hydrographic surveys * June 28; subaqueous foundations, Kinipple * Dec 13, 27-**90**; shore protection * Feb 6-**92**

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ARROSSAN works *Eng* Nov 1-**89**

BARS, in tidal estuaries, Wheeler *Eng* Feb 7-**90**; imps., Haupt *F Inst* July, D'Auria, Sep, discuss., Haupt, Oct -**89**

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BEACON lights and fog signals, Douglass *The Eng* * Mar 29-**89**

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BORDEAUX port *Eng* * Dec 13-**89**

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BREAKWATERS, concrete, Del. bay *E News* * Jan 31; do., Schermerhorn report (full) *E Rec* * May 16-**91**; and force of impact of waves, d'Auria *F Inst* Nov -**90**, Jan -**91**

BREMEN works, abs. *Inst C E* v 96 -**89**, *Zeit deut Ing* -**89**

BUOYS, elec. lighted, N. Y. *El Wld* * Feb 2-**89**; and beacons, the Pintsch compressed gas system *E News* * Jan 17-**91**; buoying and lighting tidal rivers, Wheeler *The Eng* * Apr 8, 29-**92**

CALAIS works, France *Eng* * May 17, inset, 24, 31-**89**; quay foundations, Betillart report *E News* * Jan 4-**90**; Richou, abs. *Inst C E* v 101 -**90** * *Genie Civil* v 15-**89**; inset *Inst M E* * July -**89**

CAPE Hatteras, Walters *E Mag* * July -**92**

CHARLESTON imp., Wisner *R Gaz* Sep 30-**90**

CHICAGO as a sea-port, maps *Eng* * Feb 20, do. *Sc Am Sup* * Mar 28-**91**; ed. *R Gaz* July 15-**92**

CORK port, deep-water quays, Barry, inset *Inst C E* * v 100 -**90**

CORPUS Christi, Tex., deep-water project, Kent *E & Min* * Aug 23-**90**

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DELAWARE breakwater imp. *E News* * Feb 6-92

DIEPPE, Alexandre, abs. *Inst C E* v 93 -88 * *An Ponts* v 14 -87

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GOOLE port imp., E. coast, England *The Eng* * Dec 20-89

GREAT Yarmouth, Ayers, cor. *Eng* * Dec 13-89

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LYNN Haven Bay as a har. of refuge Barroll *R & Eng* * Dec -91

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Harbor, MONTREAL imp. *E News* * May 2-**91** ; old revetment wall, Sproule *R & Eng* * Dec, *R Gaz* * Nov 18-**92**

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NAPLES works, Gatto, abs. *Inst C E* v 102 -**90**, *L'Ingeg Civile* -**90**

NEW York, bulk-head construct. *E News* * May 25-**89** ; imp. of entrance, Edwards, dredging ap., inset * Mar 19 ; masonry sea-wall, light-house station * Dec 15-**92** ; removal of obstructions, Hell-gate, abs. *Inst C E* v 93 -**88**, * Report Ch. of Eng'rs. U. S. Army -**86** ; imp. *Sc Am Sup* * Aug 25-**88**

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PHILADELPHIA port of, Haupt *F Inst* Jan, Mahan, Mar, Apr -**92**

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ROCHELLE, compressed air pier foundations, Thurninger, La Pallice har., abs. *Inst C E* v 100 -**90**, *An Ponts* * Nov -**89**

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SABINE Pass imp., Turtle, cor. *F Inst* Sep -**88**

ST. John, N. B., imp. and docks *E News* Apr 7-**88**

ST. Nazaire, France, lowering masonry shafts for quays, Mahan *E News* * Oct 27-**88**

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SAN Francisco, water-front structures, Manson *E News* * Dec 29-**88** ; caisson used in founding sea-wall, R. Hunt * Aug 2-**90**

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SWANSEA port and dredging entrance channel, Capper *Inst C E* v 103 -**91**

- Harbor**, TEXAS deep-water port, need of the So. West, Haupt *R Gaz* Aug 10, *Sc Am Sup* Oct 6-**88**
TORONTO esplanade question *E News* * Jan 4, 11-**90**
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VERA Cruz port, *E Rev* Dec 6-**90**, Corthell cor. Feb 21-**91**
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El Rev and color, Spice, Mar 30; and electricity, identity of, Herz, Dec 14-89; new photom. notes, Nichols, May 31; units of light and brightness, Weber, Sep 6; Varley's photom. * Oct 18; artificial, of future, Nichols (full) * Nov 29-90

El Wld photometry, personal error in, Nichols * June 1-89; new photom., do. * May 31; the Bolometric spectrometer * June 21; artif., of future, Nichols (full) * Nov 29, discuss. Dec 6-90; photometers * Apr 25-91; Hering's portable photom. for st. lights and illum. * Jan 16-92

Eng refraction goniometer, Trotter * May 17-89; illum., distrib. and measurement of, do. *E News* * Nov 24, do. and discuss. (full) *Inst C E* * v 110-92; the ether-oxygen lime light,

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Ives *F Inst* * Jan -88 ; mod. conception of (full) *Locom* Nov -90

Sc Am Sup and color, Abney (full) * Mar 2-23; optical torque, S. P. Thompson (full) * Aug 10 * Sep 21; mod. theory, Lodge, 28; effect on matter, Abney, Oct 5-89; the spectrum and its development, Yeo (full) * Feb 1, 8; radiophony, Bell, May 10; artif., of the future, Nichols (full) Dec 13-90; optical projection *The Eng* * Apr 22-92. See also COLOR; ELEC. light; GASEOUS illuminants; LIGHTING

Light-houses, Sautter, Lemonnier & Co's exhibit, Paris *Eng* July 19-89; illuminants, ed. Oct 31; stability, E. Schmitt, cor. *E News* * Dec 6-90; fog or dipping ap. for elec. light in, Stevenson, inset *Inst C E* * v 92 -88; French, n *R & Eng* * Apr -90, *Genie Civil*; oils, Edwards (full) *Sc Am Sup* Mar 19; lens (large), Wigham, June 11, do. *The Eng* Apr 22-92; elec., Scand. exhib., Copenhagen, Nov 9-88; Douglass * Mar 29-89. See also WAVE pressure on structures

BISHOP'S Rock and Tory Is. *Eng* Feb 26, Douglass, illum. by gas, Salmond, discuss., insets *Inst C E* * v 108 -92

BULL Rock, So. Coast Ire. *Sc Am Sup* * Oct 5 *The Eng* Aug 23 -89

CAMPEN and illum. of Lower Ems. Riensberg, abs. *Inst C E* v 103 -91, *Zeit deut Ing* -90

DIAMOND Shoal, Outer, Cape Hatteras, N. C., proposed *E News* Oct 5-89, inset * July 26, 26, Aug 2, inset * 9, *R Gaz* May 30 -90

EDDYSTONE model, Naval exhib., Lond *The Eng* * Apr 10 -91

FINLAND, recent, Strukel, abs. *Inst C E* v 110 -92, *All Bauz* -92

GIBB'S Hill cast iron tower, Bermuda *R & Eng* * Feb -89

HATTERAS light contract, ed. *E News* May 31-90. See also LIGHT-house, Diamond

MEW Is., Dublin, Griffith, insets *Inst M E* * July -88

OLD Orchard Shoal, N. Y. harbor *E News* * Feb 6, *R & Eng* * Mar -92

OYSTER Is., Burmah *The Eng* Sep 13-27-89

ST. Catherine's Point, Isle of Wight, most powerful light in world, Douglass *Sc Am Sup* * July 21 *The Eng* June 15 -88

Lighting, artif. illum., effic. of methods, Nichols (full) *El Rev Lond* * Apr 12, 19, do. (full) *El Wld* * Mar 30, do. abs *Inst C E* v 97-89, do. (full) *El Eng* * Apr-89; artif. of future, do. (full) * Nov 26-90; elec., relation to optical science, Boyle (full) *El Wld* * Nov 14-91; compressed oil-gas, Ayres *Eng* Apr 13-88; the Wells system *E News* * Aug 10-89; illum. and ventil., Lewis *E Rec* Jan 11-90; Welsbach system, Granger *F Inst* * May-88; developments in artif. illum., Morton *Sc Am Sup* Mar 16-89; by compressed oil-gas * July 26-90; Harcourt's Pentane standard lamp, Clifford *Tech Q* May-90. See also ELEC. lighting; GAS-lighting; LIGHT

Lights, st. and illum., Hering's portable photom. for *El Wld* * Jan 16-92; contractor's portable *E News* * Nov 16-89; the ether-oxygen lime light, Ives *F Inst* * Jan; the Lucigen, econom. illum. from waste oils, Hannay *Sc Am Sup* * Jan 14; floating, 8-ft. cyl. lanterns *The Eng* Nov 9-88. See also ELEC. lighting and lights

Light-ship No. 5, with elec. lights, U. S. *R & Eng* * Aug, abs. *Inst C E* v 106-91

Lightning *El Eng* Varley Sep-Dec-88; arresters and photog. study of self-induction, Acheson (full) * Feb; conductors and arresters, Brit. Assoc. discuss. Apr, May-89; arrester, Westinghouse * Apr 9; the Wirt arrester * May 7; conductors, Lodge, July 2-90; protection, Hodges * Feb 11, Hubbell, June 17-91; arresters and discuss. of non-arcing metals, Wurtz (full) * Mar 23-92

El Rev Lond Varley, July 20 – Oct 12, Nov 2, rotary motion, Parker, Dec 14-88; arresters and self-induction, Acheson * Feb 1, 15; Lodge (full) May 3-24 * June 6-20; conductors, Varley, July 5 * 19, Aug 9, Oct 4, 18-89; connection, Fischer, Jan 24. 31, Feb 7; Mar 14-28; Apr 4, 11; conductors, Varley, May 24, 31, June 7-21; thunderstorms, Hazen, Aug 15; protection of buildings, Bennett, Oct 10-90; damage, curious case. Hands, Jan 8, protection, do. Feb 19-92

El Rev peculiar motions of, Parker * Nov 24-88; arresters and self-induc., Acheson (full) * Jan 19-89; arresters and discov. of non-arcing metals, Wurtz * Mar 26; rods, McAdie, Sep 17-92

El Wld protection of elec. light stations, Jenks (full) * Aug 18; rotary motions in, Parker, Nov 24-88; arresters and self-induc., Acheson (full) * Jan 19, Brown, Child * Feb 23-89; Lodge's protectors (wires) * May 17; and the elec. spark, Bid-

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well * July 19-90; rods, E. Thomson, June 27-91; caprices, Hering * Jan 16; arresters and discov. of non-arcng metals, Wurtz (full) * Mar 26 * Apr 2, 9-92

Eng protection from, ed. Aug 3 * Sep 7; conductors, Brit. Assoc. pro. Oct 19, 26; flashes * Dec 21-88; rods, E. Thomson *E Rec* July 11-91; Jove's autograph, Jennings, insets *F Inst* * Jan -92; conductors, Kohlrausch, abs. *Inst C E* v 93 -88; do., connecting with water and gas pipes, Weber, abs. v 95 -89; conductors, Frisch report *Sc Am Sup* Jan 26; discharge, influence of gas and water pipes, Wilde, Aug 3-89; protection of chimney shafts, Molyneux, Wood, Apr 19-90; rod protection, Hodges, Apr 18-91; peculiar rotary motion of and elec. curs., Parker * *Soc Arts Mass* -89

Limberg, Charles T., por. *E & Min* * Apr 25-91

Limestone industry, Day *Sc Am Sup* July 25-91

Lime sulphite fibre manuf. in U. S., Michaelis and discuss., chem. of the processes, Griffin *Am C E* * v 20 -89, do. (full) *Sc Am Sup* Jan 11-25-90

Lindley, Robert C. *Inst C E* v 92 -88

Linnaeus, por. *Sc Am Sup* * Feb 18-88

Liquids, self-acting, measuring ap., Monte-jus *Eng* * Dec 12-90; compressed, dilatation of, Amagat *F Inst* Sep -89; heating and concentrating by steam, Hudson *The Eng* Apr 11, 18 * May 23 * June 6, 13-90

Liquors, aging, Turner's ap., Ramsay's proc., Stauffer *Sc Am Sup* * Sep 10; and preserves manuf., Brevans * Nov 19, 26 * Dec 3-31-92, etc.

Liverpool, works at *Inst M E* July -91. See also under DOCKS – WATER-works, etc.

Locomotives, Catechism of the Locomotive, Forney, bk. (very full) *R & Eng* * Jan -88 – Oct -89; effc. of, Dixon *Am M E* * v 11 -90; econ. of the, Bell *El Wld* May 24-90; practice, ed, *Eng* June 29-88; express pass., Paris exhib., inset * July 5, do. ed. 26, Aug 2, 9; Brit., cost of working, table, Nov 8-89; tank express double bogie, Brunner, cor. * Sep 26-90

E News oscillations registering ap. Feb 8; frt., for So. Am. (meter gauge) * May 17; effc. of, Dixon, Aug 16-90; of world, n Oct 20-92; vibratory movements of and on timing trains and testing R. tracks, Milne, discuss., insets *Inst C E* * v 103 -91; speed and power, Hill * v 109-92; shipping at high

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speed *Locom* July, *R Gaz*; of future, n *R & Eng* Feb -88; problem, Apr * July -92

R Gaz marine practice and locom. construct., ed. June 15; road foremān (duties), Oct 12; cost of rebuilding, 19-88; proportions, cor. (full) Apr 26; Paris exhib. * July 19, Aug 16; coal consumption as affected by enginemen, Baker, Aug 2, 30; R. I. works and Schenectady heavy express * Oct 25-89; effic., Dixon and ed. May 23, 23, ed., June 13; minimum curvature, ed. * Oct 3-90; free steaming, essential qualities, Mitchell, Jan 23; wheel wts. of heavy, Kruttschmitt * May 22-91; power, suburban pass. trains * June 10-92; waters for, Gibbs *Steven's Indic* July 15-88

The Eng cost of parts in U. S. Jan 13; single vs. coupled, Apr 13; express, designs, cor., Nov 23; engine resistance, ed., Nov 16, 16, Dec 7-88, *E News*; repairing, Barker *The Eng* Feb 21; speed, ed. May 30; how propelled, cor. * Oct 31-90; mod. construct. * Jan 1, 8 * Feb 5, Apr 22 * May 6, 20 * July 8, (brass foundry) Oct 21 * Nov 4 * Dec 30-92

ABT, Manitou & Pike's Peak R. *R Gaz* * Feb 6-91

AIR-pump governor, Barnes', Wabash R. *The Eng* Oct 19-88

AMERICAN, in New So. Wales *E News* July 21, Aug 18 * Sep 22; and English, wts. comparison, Purdon, Oct 20; exhib., Dec 22-92, *Industries*; and English, speeds *Locom* July -89; and English, eds. *R & Eng* July - Dec -90, eds., May, Aug, Nov, Dec -91, Jan, tables (full) Feb, (full) June, Aug -92

R Gaz in New So. Wales, cor. June 1-88; and English, ed. Apr 25, (full) May 9-90, Dean, July 10, relative merits, Forney (full) Nov 27-91, *R & Eng*, (proportions), table, ed. *R Gaz* May 6-92; practice in Am. *Sc Am Sup* * Nov 23-89

The Eng Am. practice * May 3 * June 21, July 19, 26, Sep 6-89 * Jan 3, 31 * Feb 28 * June 6 * Oct 17, and English, ed. Nov 7-90, trials, ed. Feb 27, vs. English, Dean, and ed. July 24, 24-91, Feb 26, Mar 4, 11, exhib. of, Apr 1, May 27-92

AM. Master Mechanics' Assoc. reports *R & Eng* July -90, pro (full) *R Gaz* June 19, 26-91, *The Eng* July 12-89. See also RAILROADS, Master Mechanics

BALDWIN, works erecting shop *R & Eng* * Dec -90; No. 10,000 *R Gaz* * Sep 27-89; Erie, 10-wheel express, inset * June 13-90; varieties built, June 5-91; in New So. Wales (full) July 15, Aug 19, *The Eng* July 1, Sep 23-92

Locomotives, BALT. & Ohio, consol. *R Gaz* * Aug 2, 30; pass.

* Sep 6-**89**; 10-wheel, tests, ed. (full) * Nov 27, 27 * Dec 11 -**91**; 6-wheel switcher, inset * July 22-**92**

BELGIAN, State R's, express pass., Paris exhib. *Eng* July 5, 5, *The Eng* * May 3, 31, 31-**89**; goods, Paris exhib. * Jan 24-**90**

BELL-ringer, steam *R Gaz* * Mar 8-**89**; White's pneu. * Aug 8 -**90**

BENGAL & No. W. R., India, and rolling stock, Rhind, insets *Inst C E* * v 91 -**88**

BLAST, pipe, influence of intermediate tuyeres, Fliegner, abs. *Inst C E* v 91 -**88**, *Schweiz Bauz* Nov 5-**87**; nozzle, Adams' variable *R & Eng* * Oct -**90**, *Eng*; pipes, Kordina's vortex *The Eng* Jan 20-**88**

BOILERS, strains in, Randolph *Am M E* v 9 -**88**;imps. in construct., Hickey *E News* * Apr 4-**91**; construct. and effic., Sheffield *Inst C E* * v 109 -**92**; *Locom* Nov -**88**; ed. *R & Eng* Oct -**88**; without stay-bolts, Bork * May; expts. with, rate of combust., B. & O., temp. in smoke-boxes, Wells, ed. * Aug -**90**

R Gaz water circulation, Hackney, Dec 28-**88**; grate areas proportions, ed. Apr 5; tubes length, ed. Nov 15; tube and rivet table, for spacing, Dec 27-**89**; C. B. & Q. experimental * Jan 3; Leach, N. E. R. Club discuss. Apr 11; expts. with tubes of varying length, Paris, Lyons & Med. * July 4-**90**

R Gaz stay-bolts, N. E. R. Club discuss. Mar 20; construct. imps., Hickey * Apr 3; incrustation, treatment of waters used, Barr, Nov 13, discuss. Dec 4-**91**; stay-bolts in, Cole * Jan 8; steel plates specs., Eastern R. of France, Feb 19; Phil. & Reading express, inset * Mar 18; care of, in Algeria, Bates * July 22 * Aug 19; scale and feed water purification, Sep 30-**92**; Dean *Sc Am Sup* Feb 20-**92**, *Nat Car and Lo Bldr*

The Eng Leach's flexible stays, Feb 10-**88**; steel, Lond. & N. W., Webb * Oct 18 * Dec 6-**89**; experimental (compound tubular), Chemin de fer d l Est, France * Nov 13-**91**; construct. * Jan 1, 8 * Feb 5; Leahy, cor. * Apr 22; double, Eastern R., France * Mar 4, 11; Great Western, converted * Oct 21, 28-**92**

ALTOONA and Penn shops, notes, ed *E. News* Apr 26-**90**

BELPAIRE, and the radial stay, and ed. *R Gaz* * Aug 1, cor. *

Sep 26, 26-**90**; 62-in., Ill. Cen. * Nov 20-**91**

CLEANER, the Trowbridge *R Gaz* * Jan 17-**90**

- Locomotives**, EXPLOSIONS, remarkable, Atlan. & Pac. *E News* * Jan 14-**88**; remarkable, Norwegian State R's * June 7-**90**; on Brit. R's *R & Eng* * Jan-Apr -**88**; in Europe *R Gaz* * Jan 18-**89**; in France and Algeria *The Eng* Aug 31, 31-**88**, in France since 1840 *An Indus* July 29-**88**; France, Belgium, Holland and England *The Eng* Jan 11 * Feb 1, 22-**89**
- FIRE-boxes, the Darby crown sheet. Grand Trunk R., Can. *Eng* * Aug 24-**88**; Webb's * May 17, 17; corrug. steel, Lond. & N. W., Webb * Aug 23-**89**; the steam-jet as a means for preventing smoke *E News* * Apr 4-**91**; ed. *R & Eng* Jan; corrug. tubular, Knaudt, abs. June; fire-brick lined (full) * Oct, Phelps, cor. Nov -**89**; corrug., Lentz, Apr-**90**; Forney's door opener * June; corrug. * Sep -**91**
- R Gaz* and coal burning, Higginson, and ed. July 20-**88**; Master Mechanic's com. report, June 27-**90**; staying, Woods, Apr 17; Hawksworth's door opener * May 1; Ten Brinck fuel saving tests, Orleans R., France * 8, 22-**91**, *Ing Civils*; Webb's steel *The Eng* * June 14-**89**
- JOHNSTONE compound *R Gaz* * May 27-**92**
- KNAUDT & Pohlmeier's, Prussian State R's *Eng* * Oct 4, *R Gaz* * Nov 15-**89**
- LENTZ's stayless *Eng* * Dec 19, *R Gaz* * Apr 4-**90** * Jan 9 -**91**
- SPEIRS' construct. *E News* Jan 23, Dean, 30, (full) *R Gaz* Jan 22-**92**
- WOOTTEN, U. Pac. express pass. *R Gaz* * June 15 * July 6-**88**
- BOSTON & Albany 4-wheel switching *R & Eng* * Nov, Dec -**91**
- BRAKE gear diags., Am. Brake Co., cor. *E News* * Jan 26-**89**
- BRISTOL & Exeter express *The Eng* * May 9, 9-**90**
- BUILDING, Am., '88, n *Eng* Mar 8-**89**; in New So. Wales, June 6-**90**; in '89 *E News* Feb 1; 40 years' course of, French, inset *The Eng* * June 20, July 18-**90**
- CAB, Balt. & Ohio *R Gaz* * Dec 16-**92**
- CALEDONIAN R. bogie pass. *The Eng* Apr 13, 13-**88**; No. 123-performance, diags. * Mar 13-**91**
- CANADIAN Pac. 10-wheel heavy pass., inset *Eng* * Jan 17, inset *E News* * Aug 30-**90**; mogul, inset *R Gaz* * May 31, inset *The Eng* * June 21-**89**
- CAPE Gov't. R's, coal burning of Colonial coal on, Stephens. insets *Inst M E* * Jan -**90**
- CAVAN R., light locom. *The Eng* Apr 20, 20-**88**

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Locomotives, CHESAPEAKE & O. 10-wheel pass., Rogers works *R & Eng* * July -90; tank switching, 2500 gals. *R Gaz* * July 27-88

CHICAGO, Bur. & Q. pass., inset *E News* * June 28; standard mogul * July 5 -90; suburb. pass., inset, ed. *R Gaz* * Dec 13-89; 75-ton decapod, Rogers works, inset * July 24-91

CHICAGO, Mil. & St. P. express *R Gaz* * Feb 20, details * Mar 6-91

CLEVELAND, Cincin. Chic. & St. L. *R Gaz* * Jan 1-92

COALING chutes *R Gaz* * Dec 11, 18-91; coaling stations, Berg, Feb 5 * 19-92

COMPOUND *Eng E*. Worthington, Jan 11; Lapage * Mar 22, 29 * Apr 5-89; English pats. on, abs., Feb 27, Apr 17-91; Sinclair *E News* Apr 20; Am. * Nov 30-89; Am. Master Mech's com. report, and ed. June 28, 28-90

E & Min compounding petrol. refuse burning, Russia, Urquhart, abs. Sep 14-89, insets, discuss. (full) *Inst ME* * Jan -90; Lapage, discuss., insets * Jan -89; the compound principle applied to, E. Worthington, insets *Inst C E* * v 96-89; Polonceau, n v 99 -90; Brueckmann, abs. v 104 -91, *Soc Ing Civils* Oct -90; relative value of different types, abs. *Inst C E* v 106 -91, *Am Mas Mech* 24th report

R & Eng 4-cyl., Bousquet, and ed. * Mar -89; Master Mech's com. report, July -90; development of compound system, Mallet (full), Feb, ed. * Mar - June -91; Webb, Jan; early description, n * June, ed. Sep -92, *F Inst*

R Gaz in Am. service, ed. * Feb 15, 22; Sinclair, N. E. R. Club discuss. Apr 19; May 10; starting power of, Neale, cor. Aug 16; Barnes, discuss. Oct 18; India, Hughes * Nov 22; ed. * Dec 20-89; mathematics of, French, Mar 7; Polonceaux, Apr 18; Master Mech's com. report, June 27; early, Perry & Lay * Sep 19-90

R Gaz pats. on (list), Feb 13, English * 20; braking power of steam cyls. of * Apr 3; relative value of different types, Master Mech's discuss. * June 26; cyl. proportions, Oct 2; U. S., table, Dec 18-91; in frt. and pass. service, Woods, Jan 1; trip-expan. n May 13; three-cyl. * Dec 30; Master Mech's com. report, abs. July 1, (full) *Ry Age* sup. June 24-92

Sc Am Sup compound prin. applied to locoms., E. Worthington, Mar 30-89; steam distrib. in, Snow * May 10-90, *R Mas Mech*; comp. prin., Worthington *The Eng* Jan 25-89; cyls.. Harrison, cor. * June 6-90; Rickie, cor. Oct 23-91

- Locomotives**, COMPOUND, ARGENTINE Great Western, burning liquid fuel *The Eng* * May 15-**91**
- ARGENTINE Midland R. *The Eng* * Dec 27, 27-**89**
- AUSTRALIA, Baldwin, tests of Vauclain (full) *R Gaz* May 29 * Aug 7-**91**
- BALDWIN four-cyl. and ed. *R Gaz* * May 2, 2-**90**; * May 1, table, Nov 27-**91**. See also LOCOMS., comp., Balt.
- BALTIMORE & O., Baldwin, details, inset *E News* * May 3, 3, tests of and ed. Sep 6 * 13, 13, narrow-gauge * Dec 13; tests, Barrus (full), and eds. Sep 12, 12, 19 *The Eng* * Sep 19, 26-**90**
- BATCHELLER's pat. valve *R & Eng* * May; R. I. Locom. works, Franklin Inst. medal *R Gaz* June 3-**92**
- BROOKS two-cyl. *R Gaz* * Nov 25-**92**
- CHICAGO Mil. and St. P. tests, inset *R Gaz* * Aug 5, 5-**92**
- DEAN's *R Gaz* * Nov 25-**92**
- EAST Tenn. Vir. & Ga. indic. diag. *E News* * Nov 22-**90**; ten months' test of, Dec 5-**91**
- FRENCH *R & Eng* * Aug -**89**; recent *R Gaz* * Jan 3-**90**
- GERMANY, in, Stambke *E News* * Apr 19, May 3-**90**
- GRAZI-Tsaritsin R. goods, petrol. refuse, Urquhart *The Eng* * Jan 31-**90**
- HUNGARIAN State R's *E News* * Feb 6-**92**
- JOHNSTONE'S double truck, Mex. Cen. *E News* * Aug 29-**91** * Mar 12-**92**; abs. *Inst C E* v 106 -**91**; Mex. Cen., tests (full) *R Gaz* * May 22, 29, Oct 9; 10-wheel, inset * June 5; trials anal., cor. Sep 25-**91**; double bogie, Mex. Cen., inset * Mar 25, test * Aug 26 (full) * Dec 30, 30-**92**. See also LOCOMS., comp., Mex. Cen.
- LAKE Shore & Mich. So. frt. *R & Eng* * Dec -**92**
- LINDNER's starting gear, system for *E News* * June 16, do. *R & Eng* * Dec -**92**, do. *R Gaz* * Nov 15-**89**; do. in Russia * Mar 13, 27-**91** * Sep 2-**92** *The Eng* * May 23-**90**
- LONDON & No. W., Edinb. exhib., inset *Eng* * July 25-**90**; Webb's, with Joy valve gear *E News* * Jan 26-**89**; frt. *R & Eng* * Feb; Webb's *The Eng* Dec 21, 21-**88**
- MALLET's, Decauville R., Paris exhib. *Eng* * May 3, do. *E News* * June 1-**89**; largest and smallest *R Gaz* * Aug 15-**90**; prog. in use of * Feb 6, arguments pro and con, Polonceau, 13-**91**, *Ing Civils*; Paris exhib. *The Eng* * May 24-**89**

Locomotives, COMPOUND, MEYER-Lindner duplex, Roy. Saxon St. R. *R Gaz* * Sep 2-92

MEXICAN Cen. 10-wheel Johnstone's double truck, inset *E News* * Aug 29-91 * Mar 12, inset (full) * 26 * Apr 2, valve motion * 9-92; Johnstone, tests *R & Eng* * June, n Aug-91, Nov-92, do. *R Gaz* May 29, Oct 9-91, test * Aug 26-92

MEXICAN National R., dimens., news n *E News* Dec 13-90

MICHIGAN Cen., Schenec. works *Eng* * Apr 4-90 *E News* Jan 25, and ed. * Mar 8-90; ed. *R Gaz* * Jan 31, ed. Feb 14-90; 10-wheel pass. * Jan 23-91

MISSOURI, Kan & Tex., and simple, comparative tests *R Gaz* Nov 11-92

NORTH Eastern R., England, express, Worsdell, inset *Eng* * Mar 30 * Apr 13-88 * June 21, 21-89; pass do. *R & Eng* * May -90; tank engine *The Eng* Oct 26, 26, goods tank, Nov 23, 23-88; express, inset * Feb 28 * Mar 7-90

NORTHERN R. of France, goods, Paris exhib., inset *Eng* * Dec 6-89; 4-cyl. fast pass., Bousquet, n *R & Eng* Jan * Aug *R Gaz* * Aug 12 *The Eng* * Sep 2-92

PARIS, Lyons & Med. R. *The Eng* * Aug 9-89

'PENN,' the *R Gaz* * May 3-89

PITKIN's pat. *R & Eng* * Mar -90

PRUSSIAN State R's, goods, Worsdell system, inset *Eng* * Feb 1-89

RHODE Is. Locom. works, com. report, insets (very full) *F Inst* * May -92; Batcheller, bk. review *R & Eng* Jan -91; test in express service, Jan -92; and simple, study of, expts. *R Gaz* * Jan 9; system of (full) * Dec 11-91

RUSSIA, petrol. fuel, Urquhart *Eng* Feb 7 * 21 * Mar 7, do. *E News* * June 14-90

St. Gothard R., duplex *E News* * Aug 15-91

St. Petersburg & Warsaw R., pass., inset *Eng* * Sep 9, *R & Eng* * Nov -92

SAXON State R's express, dimens. *R Gaz* * Nov 22, 29-89

SOUTHERN Pac. *E News* * Apr 28-92; 10-wheel, inset *R Gaz* * Sep 11-91

SWISS, Jura-Berne-Lucerne R., pass. mogul, inset *Eng* * Feb 7; *R Gaz* * Sep 12-90

TESTS, Baldwin, Balt. & O. and ed. *E News* * Sep 6, 13, 13; Union El. R., Brooklyn, in fast pass. service, Dec 27-90

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* Jan 3; 10 months, E. Tenn. Vir. & Ga. Dec 5, 12-**91**; Vauclain * June 23, ed. 30, 30, indic. diag. * July 7-**92**; Johnstone, Mex. Cen. *R & Eng* * June * Aug; W. N. Y. & Pa. R. Oct -**91**; R. I. works, in express service, Jan; Johnstone, Mex. Cen. Nov -**92**

R Gaz B. & O., Barrus, (full) Sep 12, 19-**90**; R. I. works expts. * Jan 9; Johnstone's (full) * May 22; Vauclain, May 29, * Aug 7; Johnstone, trials anal., cor. Sep 25; and simple, comparative, W. N. Y. & Pa. Oct 2, Baldwin, Mex. Nat. Dec 4-**91**; Johnstone, Mex. Cen. * Aug 26; and simple, comparative, Mo. Kan. & Tex. Nov 11-**92**; comparative, Hudson *Sc Am Sup* Jan 23-**92**, *J Assoc E Socs*; B. & O. *The Eng* * Sep 19, 26-**90**

VALVE gear, variable expansion, Dunlop, cor. *Eng* * Feb 13-**91**; for Hope & Co., cor. *R Gaz* Sep 19-**90**

VAUCLAIN, 4-cyl. *E News* * May 3-**90** * Feb 20; tests * June 23, ed. 30, 30, indic. diags. * July 7-**92**; com. report *F Inst* * July -**91**; patent, n *R & Eng* Jan -**90**; tests *R Gaz* May 29, Australia, Baldwin, tests * Aug 7-**91**; Manitou & Pike's Peak rack R., n * Aug 12-**92**

VON BORRIES', starting valve for (full) *R Gaz* * June 12-**91**. See also LOCOMS., comp., Worsdell & Borries

WEBB's, Lond. & N. W., with Joy valve gear *E News* * Jan 26, *Eng* * June 7-**89**, *The Eng* Dec 21, 21-**88**

WOOLFE 4-cyl. double-expan., ed. (full) *R Gaz* * Mar 8, 8-**89**

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DOUBLE end saddle tank, Porter *R Gaz* * June 14-**89**

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- Locomotives**, FEED water heater and purifier, Barnes' *E News* * Aug 9 *R Gaz* * July 25-90; purification, Northwest R. club discuss., C. N. Hunt, Dec 13, 20-89
- FIRE-boxes, brick arches in, Am. R. Master Mech's com. report *E News* Aug 9-90. See also LOCOMS., boilers, fire-boxes
- FIRE extinguisher, Penn. R. *R Gaz* * July 19-89
- FREIGHT, hauling capacities, table *R Gaz* Nov 21-90
- FRENCH, Paris exhib. *R & Eng* * Nov, pass. * Dec -89; tank * Feb -90 *Eng*; notes *R Gaz* * Jan 16, 23-91; Chemin de fer d l'Ouest, express *The Eng* * Oct 4, 11-89. See also LOCOMS., Eastern R. of France
- FUEL, premiums, Russia, Borodine *R Gaz* Sep 27-89; Yates' mileage card, Aug 1-90; petroleum, liquid fuel on *Eng* * Oct 19-88, working of, Urquhart * Feb 8, 15-89, do. tests *E News* * Feb 2-89, burning * Aug 25-92, do. Dudley *F Inst* * Aug -88, in So. E. Russia, Grazi & Tsaritsin R., Urquhart, discuss., insets *Inst M E* * Jan -89 *R & Eng* * Jan -89, on Great Eastern R., England, Booth *R Gaz* * Feb 26-92 *Sc Am Sup* * Nov 24-88, working with, Urquhart (full) * Sep 27 * Oct 4-90. See also LOCOMS., boilers, liquid fuel
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- GLASGOW & So. West., pass., inset *The Eng* * Mar 1, 22-89
- GRAND Central R., Belgium, tank, inset *Eng* * Aug 16-89
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- GREAT Western, England, broad and narrow gauge convertible, inset *Eng* * July 8-92; works, Swindon *The Eng* Nov 16-88; early * May 20, 27-92

- Locomotives**, HEADLIGHT, elec., Pyle's *El Wld* * Sep 27-**90**, abs. *Inst C E* v 103 -**91**; elec. *R Gaz* Nov 29-**89**, Jan 17-**90**
- HIGHLAND R., Scot., standard pass., inset *Eng* * Oct 9 *R & Eng* * Dec -**91**
- HISTORY, the DeWitt Clinton, G. H. Thomson, inset *Am C E* * v 23-**90**; old, the 'Sampson,' Robb *Am M E* v 10 -**89**; early, see H. Allen, v 11 -**90**; early, the steam buggy *E News* * Sep 8-**88**; early, Horatio Allen * Jan 11; the John Bull * 18; hist. of development, ed. 18-**90**; Tomlinson, Pres. addr., insets, (full) *Inst M E* * May -**90**
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- HOELLENTHAL R., inset *Eng* * Feb 6-**91**
- HOIST, Chic. & No. W. *R Gaz* * Feb 5-**92**
- HUNGARIAN State R's, tank *The Eng* Feb 3, 10-**88**
- ILLINOIS Cen. suburban, tests (full) *R Gaz* * June 17-**92**
- INDIA. Sind Pishin section, Indian State R's *Eng* Apr 13 * 20-**88**, inset * Apr 19-**89**, 6-coupled, meter gauge *The Eng* Mar 23-**88**; Indian Midland tank * Nov 22-**89**
- INDICATOR diags. at high speeds *E News* * June 9, compound and ordinary, comparison * July 7-**92**; indicating. Lyne, *R Gaz* * Aug 2, Manning, cor. 16-**89**, do. Dean * Feb 28; indicator cock, 4-way, Gifford * Mar 7; diags., Worsdell's high speed compound * Mar 28, No. E. R., England and ed. (and train resistance) 28-**90**
- IRON Range & Huron Bay heavy frt. *E News* * June 16, 12-wheel, inset * July 7-**92**
- ITALIAN pass. *R & Eng* * June -**90**; Ital. Med. R. *The Eng* Nov 9-**88**, pass. * Feb 1 * Mar 29, goods, Sep 6 * Dec 20-**89**, Paris exhib. * Feb 21-**90**
- JAPAN Imperial R's tank, inset *Eng* * Feb 10-**88**
- LAKE Shore & Mich. So. express, Brooks works (details), inset (full) *R Gaz* * Nov 16-**88**
- LANCASHIRE & Yorkshire, England, pass., inset *E News* * Mar 28; 6-wheel frt. *R Gaz* * Jan 30; tender water-scoop * Dec 25-**91**; standard goods, inset *The Eng* * Jan 1-**92**
- LONDON, Brighton & So. Coast pass. *R & Eng* Sep, express pass., Paris exhib. *The Eng* July 19, 19-**89**

- Locomotives**, LONDON & No. W., Crampton engine, 1847, inset *The Eng* * Nov 28-90; compound express * Nov 20-91
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- MEXICAN Cen. (Fairlie system), inset *Eng* * May 14-90; average econ., Johnstone, cor. *R Gaz* Nov 20-91
- MICHIGAN Cen. 10-wheel express *R Gaz* * Feb 24-88
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- NARROW gauge frt., for So. Am. (meter gauge), Sharp Stewart, Glasgow *E News* * May 17; compound, Baldwin * Dec 13-90
- NEWPORT News & Miss. Val. 10-wheel frt. *R Gaz* * Mar 16-88
- NEW So. Wales Gov't. R's, Baldwin 10-wheel *R Gaz* * May 29-91 *The Eng* Nov 23-88 (full), July 1, Oct 14-92
- NEW York Cen. & H. R. 19 x 26 Brooks mogul, inset *R Gaz* * July 25-90; suburban, inset * Sep 11-91
- NEW York, L. Erie & W. express, inset *R Gaz* * Jan 6-88
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- OLD Colony R., simple and compound, tests, tables *R Gaz* Sep 16-92; pass., inset *The Eng* * Nov 14-90
- OSCILLATIONS ap., West. R. of France *Eng* * Jan 10; registering ap. *E News* * Feb 8-90
- PENN. R. pass. *The Eng* * Oct 17, 17-90

- Locomotives**, PHILADELPHIA & Reading heavy consol. *R Gaz* * Jan 4-**89**; express * Apr 15-**92**
- PIECE-work classification (full) *R & Eng* Jan - Mar -**92**
- PISTON, rod breakages, report *R & Eng* * Nov; Am. balance piston *R Gaz* * Jan 3-**90**
- PRUSSIAN *R Gaz* July 11-**90**
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- RAUB, the, n *The Eng* Dec 7-**88**
- RESISTANCE, engine and ed. *E News* Jan 5, 5-**89**
- REVERSE lever, Cumb. & Pa. R. *R Gaz* * May 23-**90**
- RICHMOND works *R & Eng* * Oct -**90**
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- ST. Clair tunnel decapod tank frt., inset *R Gaz* * Apr 3, 10-wheel *The Eng* * Apr 24 * May 29-**91**
- ST. Gall & Garis mt. road R., Switz., inset *Eng* * Dec 30, 30-**92**
- SANDING ap., steam *Eng* * June 29, do. *R & Eng* * Aug, do. *R Gaz* * Sep 14-**88**; Leach's sand feeding ap. *E News* * Feb 13-**92**
- SAXON State R., 4-cyl. compound *The Eng* * Oct 23-**91**
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- SHAY, the, Gilpin Tramway, Col. *E News* * Apr 26-**90**, inset *R Gaz* May 8-**91**
- SLIDE valves, friction of, Aspinall, discuss., insets *Inst C E* * v 95 -**89** *The Eng* Dec 28-**88**; and cyls., Lond. Br. & So. C. R. Aug 23-**89**
- SMOKE-stacks, and exhaust nozzles design, W. H. Lewis *E News* * June 23-**92**; cast iron *R Gaz* * Apr 18-**90**; Manhat. eleva. R. * Mar 4-**92**; straight, theory of, Snow *Sc Am Sup* * Apr 13-**89** *Am Mas Mech*
- SOUTH Eastern R., England, express pass., Paris exhib., inset *Eng* * Apr 25 * May 2 *E News* * Feb 22-**90**, inset *The Eng* * Nov 29 * Dec 13-**89** * Jan 3-**90**
- SOUTHERN R., Italy, goods, inset *Eng* * Oct 31-**90**
- SOUTHERN Pac. R., 8-wheel, diag. *E News* * Apr 25-**91**
- SPARK arresters, Bell's *R & Eng* * Mar; Brown's and smoke stack *R Gaz* * Nov 14-**90**
- SPRINGS and equalizers, Master Mech's com. report *R Gaz* * June 29-**88**
- STRONG, the, distrib. of steam in, Dean *Am M E* * v 9-**88**, sup. v 10-**89**; inset *Eng* * May 17, 17, cor. June 7-**89**; Strong Manuf. works * June 6-**90**; remarkable run *E News* Apr 6-

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- Locomotives**, VALVE gears, Bonnefond's *Eng* * Dec 20-89, do.
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Police signalling, Morgan's aut. elec. system, Hill *El Rev Lond* * Mar 7-**90**

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- LAKE Shore & Mich. So., report and ed. *R Gaz* May 18-88, May 10-89
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- BRIENZ & Rothhorn rack, Preller, inset *Eng* * Nov 11, 18 *E News* * Dec 15-**92**
- BRUNIG, Switz. *E News* Dec 15-**88**
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- DUNDERBERG gravity, Hudson Highlands, map *E News* * Dec 21-**89**
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- GENEROSO, Lake Lugano, Switz., abs. *Inst C E* v 107 -**92**
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- HOELLENTAL rack, Baden *Eng* * Jan 30, insets * Feb 6, 27 * Mar 13-**91**
- HONG Kong & Victoria Gap tramway *The Eng* * Jan 23, 30, 30-**91**
- JUNGFRAU, Switz., projected, King *Eng* * July 4, pneu. *E News* Mar 29 * July 19 *R Gaz* July 18-**90**
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Cassier's mechan. refrigeration, Penney, * Dec -**91**; La Vergne Co. * Apr -**92**; Bate Co. decis. *El Wld* Feb 2-**89**; de la Vergne system, inset *Eng* * June 15, 22-**88**; ammonia compression system * Feb 8-**89**; machines, Richard, bk. review, Jan 9; tests * July 31 * Aug 28; and ice-making plant, Newcastle-on-Tyne * Dec 4-**91**

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Refuse, disposal, house *Eng* May 15-**91**; Watson (full) Sep 16 * 30, and ed. *E News* Oct 6, N. Y. city report, 27 * Dec 1; cremators *E Rec* * Oct 8-22, Nov 19-**92**. See also **CREMATORIES**; **MUNIC.** eng.

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Rendering tanks construct. *Locom* Feb -**89**

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E Rec distrib., Curtis, June 20; water storage, Stearns, Oct 17; det. of capac., Fitz Gerald, 24; storage, Mass. State Bd. of Health report, Nov 14-**91**; use of asphaltum for linings, Schuyler, Dec 17-**92** *Am C E*; res. dams, safety and service of, Kresnik, abs. *Inst C E* v 99 -**90** * *Woch Ost Ing* -**89**. See also DAMS; WATER-works, under names of places

BOSTON, Mass., Waban Hill *E Rec* * Aug 24, 31-**89**

BUFFALO, N. Y., Prospect, new *E News* * Jan 10-**91**

COSHOCTON, O. 320,000 gal. covered *E Rec* * Aug 15-**91**

EALING, Grand Junct. Co. storage *The Eng* Aug 24, 24-**88**

EGYPT, the Raiyan impounding, Nile flood, Whitehouse *Eng* * Sep 14-**88**, Sep 19-**90**; storage in, ed. Oct 16-**91**

HALLINGTON, West, Henzell, inset *Inst C E* * v 102 -**90**

HUDSON, Wis. covered *E News* * Mar 15-**90**

MANCHESTER works, inset *Eng* Feb 5-**92**

NASHVILLE, Tenn., Parsons *E News* * June 16-**88**

NEBRASKA City, Neb., failure of *E News* * Apr 19-**90**

NEWTON, Mass. covered *E Rec* * Apr 18-**91**

NEW York, reservoir 'M,' inset *E News* * Mar 22-**90**

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TORCY, France *R & Eng* * Jan -**90**

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WHEELING, Va. *E News* * Mar 12-**92**

Resins, waxes and solid paraffins, Church (full) *Sc Am Sup* * Apr 9-**92**

Retaining walls, for earthwork, Greene *E News* * Dec 29-**88**; design of, K. Allen *E Rec* * Nov 12, 19; old revetment wall, Montreal har., Sproule *R & Eng* * Dec *R Gaz* * Nov 18-**92**; M'Elroy, Nov 9-**88**. See also DAMS; HARBOR eng; R's, embank; RESERVOIRS

Retort, mechan., with continuous feed and discharge, Haig *E & Min* * Jan 31-**91** *J Soc Chem Ind.* See also GAS retorts

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Rhind, James *Inst C E* v 99 -**90**

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Richardson, Robert *Inst C E* v 107 -92

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Riddell, Robert (full) *Inst C E* v 106 -91

Rigden, John L. *Inst C E* v 109 -92

Ring, Robert *Inst C E* v 100 -90

Rings, thin elastic, flexure of, De V. Wood *Am M E* * v 12-91

Riotte, Eugene N., por. *E & Min* * May 16-91

River-gauging at Vyrnwy reservoir, Parker, inset *Inst C E* * v 92 -88

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River profile of bottom register ap., Stecher *E News* * July 25, n *R & Eng* * Oct -91

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AIRE & Calder nav. and canal waterway, Bartholomew *E News* * Aug 30-**90**

AVON imp. below Bristol, Chatham, insets *Inst C E* * v 98 -**89**

BAVARIA, imp. *E News* * Mar 17-**88**

BILBAO imp. *E News* * Aug 31-**89**, Churruca report, abs. *Inst C E* v 76, 98, 104, insets, 107 -**92**

BRAZOS, Tex., imp., jetties *E News* * May 18, June 22-**89**

BRENTA imp., Cesareni, abs. *Inst C E* v 99 -**90**

CLYDE, Millar, Blackie, Lond. '88, bk; export trade '88 *Eng* Jan 4; Macalister, abs. *Inst C E* v 95 -**89**

COLORADO cañons, availabil. for R. purposes, Stanton, discuss., insets (full) *Am C E* * v 26 -**92**

COLUMBIA, jetty *E News* * Apr 18-**91**

COSEL, imp. at, Oder river (Europe) *E News* * May 3-**90**

DANUBE imp. *E News* July 11-**91** * Apr 2-**92**; the Sulina mouth of, Kuhl, Hartley append., insets, *Inst C E* * v 91 -**88**, inset * v 106 -**91**

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JAMES, imp. at Richmond, Va., W. Adams *E News* Nov 22 -**90**

LOIRE, imps., Paris exhib., map *Eng* * July 19, 26-**89**

MAIN, canalization between Frankfurt and Mainz, abs. *Inst C E* v 92 -**88** *Deut Bauz* -**87**

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- struct. Nov 9; bank protection * Oct 26, Dec 14-**89**; flood of 1890, Harrod, Apr 5; Lower, protection from overflow, J. B. Johnson, 19-**90**; Sabine Pass imp., Turtle cor., Haupt *F Inst* Aug -**88**; hist., Redway (full) *Sc Am Sup* July 11, 18-**91**
- ODER, imp. at Cosel (Europe) *E News* * May 3-**90**
- PORTLAND, W. T., imp., Freeman, inset *E Mag* * Aug -**92**
- POTOMAC basin, hydrography of, Babb, discuss., inset *Am C E* * v 27 -**92**
- RHINE reg. works, between Eltville and Oestrich, Imroth, abs. *Inst C E* v 92 -**88**; reg. at St. Gall, Wey, abs. v 103 -**91**
- RHONE, imp. of months of, Guerard, report abs. *Inst C E* * v 101 -**90**. See also POWER, Rhone river at Geneva
- SEINE, lower, Suresnes locks and weir, Luneau, abs. *Inst C E* v 101 -**90** *An Ponts* * v 18 -**89**; canalization of, abs. *Sc Am Sup* * Mar 16-**89** *Genie Civil*
- STEERING and Wainfleet Haven imp. *The Eng* * May 13-**92**
- SUSQUEHANNA floods, Raymond report *E Rec* Jan 23-**92**
- WEAVER nav., Sauer *E News* Aug 30-**90**; Stoney's sluices, Manchester ship canal *The Eng* * Jan 9-**91**
- WITHAM channel and outfall imp. works, Williams, discuss., inset *Inst C E* * v 95 -**89** *The Eng* Dec 7-**88**
- YELLOW *E News* Mar 31-**88**
- Rivet** signs, uniform system of *E News* Jan 25, cor. Feb 9, symbols, cor. * Mar 2, Seaman, cor. * Apr 13-**89**; diag. * Sep 15 -**92**
- Riveted** joints, on an angle, expts., Flint *Am C E* * Oct 27-**92**; copper, strength *Eng* * Apr 24; * Dec 4-**91**; riveting tests, Buckholz * Dec 6-**90**; diags. * Feb 6-**92**; net section in, Cooper *R Gaz* * Aug 22; plates, tests * Oct 10-**90**; Allen (full) *Sc Am Sup* * July 18-**91**; of max. strength, Nicolson *The Eng* Oct 19, Nov 9, 30-**88**. See also BOILERS, riveted joints
- Riveter**, Allen pneu. *Eng* * Nov 23-**88**; Schonbach's hydr. * May; hydr., 200-ton plant * Feb 14, 14-**90**
- Road** engines, rollers *Cassier's* * Aug -**92**; locom., Burrell *Eng* * June 20; steam on common roads, McLaren, Nov 21 *The Eng* Nov 21 *E News* Dec 20; locom., Aveling & Porter * June 28-**90**; traction, European experience, McLaren * Apr 4; the Springfield steam roller, inset * Nov 21-**91**; Burrell compound *The Eng* * Dec 12-**90**; 8 h. p. compound * Sep 11 -**91**

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Robertson, James (full) *Inst C E* v 99 -90

Robinson, Moncure (full) *Am C E* v 26 -92, n *R Gaz* Nov 13-91

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Rock, drilling machine, hydr. *Eng* * Feb 17-88; Dubois' boring machine, Paris exhib. July 12-89; M'Culloch's drill, Rio Tinto * Sep 12-90; drills, Carbutt & Davey, Mar 27; and ore breaker, Gates I. Co., Chic. * June 19-91; and ore crusher, Brennan *E News* * Oct 18-90; removal under water without explosives, Lobnitz, inset *Inst C E* * v 97 -89. See also DISINTEGRATOR; DRILLS; MILLS; QUARRIES; STONE and names of rocks

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Rome, excavs. in ancient, Lubbock *Sc Am Sup* Mar 22-90; devel. of capital at, Hemphill, Oct 1-92

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E Rec iron mill * Jan 25 * Feb 1-90; arcade, Cleveland * Mar 21, 28 * Apr 4; erection traveler, Newport News Ship Bld. Co. * Apr 25; Charleroi plate glass works * May 9; iron shop * Aug 29; strains in trusses *Locom* * May -91

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AGRIC. bld., Chic. exhib. *Eng* * Apr 29 * May 6-92

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FOUNDRY plant, the Worthington, Elizabethport, N. J. *E Rec* * Apr 2-92

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Ropes, manila and hemp, strength and power transmiss., Miller, diag. *E News** Dec 6; *The Eng* Dec 19; and hitches *E Rec** July 19-90; strength of, Duboul, abs. *Inst C E* v 92-88, do. expts., French *R Gaz* June 29-88. See also CABLES; WIRE ropes

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- Routledge**, Thomas *Inst C E* v 92 -88
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- Royal** Institution Soc., Lond. pro. *El Rev Lond* May * June 12-26-91; *Eng* May 16, 23-90, May 22, 29, June 5-26, July 3, 10, Dec 18, 25-91, Jan 8-22, Feb 12, Mar 4, 11, 25, June 17, July 22, Aug 12, 19, Dec 9, 30-92; pors. members *Sc Am Sup* * Sep 7-89; June 14-90
- Rubber**, india, properties, in Russian navy, Vladimiroff, abs. *Inst C E* v 109 -92; *Sci Am* Apr 6-89; vulcanization of, Gerner *Sc Am Sup* Jan 4; * July 12, Sep 6; indus., hist. (Hayward's expts.) Oct 18; vulcanization and decay of, notes, W. Thomson, Dec 6-90; supplies sources, Sherman, Feb 6; gathering in Amazon valley, Kerbey, Mar 19-92. See also GUTTA-percha
- Rundle**, Cubitt S. *Inst C E* v 100 -90
- Russ**, William *Inst C E* v 104 -91
- Russia**, commerce and mineral industries, ed. *Eng* Dec 25-91; diagonally through, ed. cor. *E News* Oct 11, 18-90
- Russian** sheet iron *Sci Am* Feb 2-89
- Ryan**, Jeremiah *Inst C E* v 107 -92
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- Safety** lamps, the Thorneburry *Eng* * Nov 15-89; miner's, notes, Hughes *E & Min* * Mar 28-91
- Safety** valves, lever (full) *Locom* * July -92
- Sahara**, the, James *Locom* Aug -89 *Sc Am Sup*
- Sails**, action of, Vogt, cor. *Eng* * Oct 11 *Sc Am Sup* * Dec 21 -89
- St. Louis**, Mo., pavements, Macklind *E News* Mar 14; topog. survey of, Connet, Oct 31-91; pub. works management, Jan 23; new growth of, Ralph *Harper's M* * Nov -92. See also PAVEMENTS; SEWERS; STREETS; WATER-works, etc.
- Salida**, Col., inset *E & Min* * Dec 21-89
- Salmond**, John M. *Inst C E* v 102 -90
- Salt**, works, obtaining brine, Brush, Tully Pipe Line Co., N. Y., discuss., insets *Am C E* * v 23 -90 *E News* July 5-90; the Petite Anse mine, La., Pomeroy *Am Min* * Apr 17-89, Bolton *Sc Am Sup* July 28, Pomeroy * Nov 10 *E & Min* * Oct 6-88; manuf., Pick's system in vacuo * July 12-90; wells, Onondaga, '90, Engelhardt, Feb 21-91; U. S. produc., do. Jan 2; manuf., China * Feb 6-92

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Sandstone indus., U. S., Day, Cens. bull. abs. *E & Min* July 4
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Eng manganese-steel, Hadfield, Sep 7-21, dis., insets (full) *Inst C E* * v 93 *Sc Am Sup* Apr 7-**88**; Brymbo works * May 10; hydr. pressure treatment, Greenwood, 17; Firming Co., at Paris exhib. * July 26; hardening and tempering of, Roberts-Austen, Sep 27, (full) *Sc Am Sup* Oct 26, behavior under stress, Carus-Wilson *Eng* * Dec 13-**89**

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E & Min steel making, cost in Ala., Phillips & Claghorn, Mar 2; compressing, Boulton ap., Crane * May 18; basic Bess. proc. in U. S., Phillips, July 13-**89**; Bess. practice, curious, Howe, June 28, in Robert vessels, notes, Aug 30; open-h., novelties in procedure, Howe, Sep 13, Bess. proc. notes, do. * Oct 4, how invented and perfected, H. Bessemer, 11-**90**

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E News direct proc. tests * Jan 21; 20 years of open-h. experience, Koch, June 9-**88**; tests (Carbon I. Co.) Apr 6; drifting tests of structural * 27, May 18; hydr. pressure treatment, Greenwood, July 6, dis., inset (full) *Inst C E* v 98 -**89**

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Stephens, Frederick C. *Inst C E* v 96 -**89**

- Stephenson**, Henry P. *Inst C E* v 101 -90
- Stereotyping**, quick proc. *Locom* June *Paper Wld*, *Sc Am Sup* Aug 4-88; Bolas (full) Oct 25 * Nov 1-90, Feb 21-91
- Stevenson**, George W. *Inst C E* v 99 -90
- Stevenson**, Thomas *Inst C E* v 91 -88
- Stileman**, Francis C. *Inst C E* v 98 -89
- Stock** (quotation) printer, the Wiley *El Wld* * Jan 14-88
- Stokers**, aut. conveyor *Eng* * June 14, 28; Roney *Pwr* * Aug *St R J* * Aug -89. See also BOILERS, stokers; MECHAN. stokers
- Stollmeyer**, André B. *Inst C E* v 107 -92
- Stone**, Mason's stone-breaker *Eng* * Nov 25-92; Gov't. contracts *E News* June 2; and cement, crushing strength, Baker, 23-88; cost of dressing, Cooke, Dec 13-90; cements and bld. material, method of testing resist., Durand-Claye *E Rec* May 11, abs. *Inst C E* v 95 -89 *An Ponts* * v 16 -88; stone-cutting and quarrying by wire, abs. *Inst C E* v 95 -89; sawing machines, abs. v 106 -91; Ark. syenites tests, Wins *R & Eng* Jan -91; artificial 'Ferroid,' Poole *Sc Am Sup* Nov 8-90 *J Assoc E Socs*; circular saw *Sc Am Sup* * May 2-91; artif. silica making, Aug 20-92. See also BLUESTONE; BUILDING stones; GRANITE; LIMESTONE indus; SLATE, etc.
- Stone**, Charles S., Raymond *Sc Am Sup* Mar 23-89 *E & Min*
- Stone**, Thomas W. *Inst C E* v 109 -92
- Stoneware**, adaptation to chem. ap., Rix *Sc Am Sup* * July 25 * Aug 1; manuf. Orton, Dec 19-91. See also EARTHENWARES, porous
- Storage** batteries, elec., or accums., Salom *Am Min* * v 18 -90; Reckenzaun *El Rev Lond* Jan 6, June 22, July 6, 13, Aug 3, 24, Nov 9 *El Rev* Dec 1-88 *Sc Am Sup* Feb 2-89 *El Eng* Sep, Oct -88, Jan; litigation, Apr; defects of lead secondary, Duncan * June *El Rev Lond* * July 19, dis. (full) *E Wld* * June 15-89 *El Eng* in train lighting, Brown, dis. July; regulating accums. in elec. lighting, methods, Prescott (very full) * Nov, (full) *El Rev Lond* * Nov 22, 29, Dec 6, (full) *El Rev* * Nov 9, (full) *El Wld* * Nov 9, dis. 23; chem. of, Frankland, Oct 25-89, Aug 22-90 *El Rev* Nov 2-89, expts. Sep 20-90 *Sc Am Sup* Nov 2-89, Nov 1-90 *El Eng* Nov, Dec -89 *El Eng* working effic. of secondary, Ayrton, Aug 13, (full) *El Rev Lond* * July 18, 25 * Aug 1. 8, (full) *El Wld* * Aug 9-30 *E News* * Sep 6; aut. reg. of accum. circuits *El Eng* * Oct 1; Elec. Stor. Bat. Co's system * 8-90

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Inst C E land, astron. as applied to, Downes * v 108; spirit leveling of Switz., Messerschmitt, abs. v 109-92 *Schweiz Bauz*; Italy, geodetic map *R & Eng* * Nov-88; France, geodetic work, Aug-89; prob. * Dec-90; hand telescope for stadia-work, Richards *Tech Q* * Apr-92. See also INSTRUMENTS; TUNNEL surveying

Swallow, James S. *Inst C E* v 101-90

Sweet, John E., por. *Cassier's* * Apr-92

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Sylvanite mine, Col. *E & Min* * Dec 15-88

Sylvester, James J., por., Cayley (full) *Sc Am Sup* * Apr 13-89

Szegedin, Town of, reconstruction (after flood), Stübben, abs. *Inst C E* v 92-88

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Talc *E & Min* May 25-89

Talking machine. See PHONOGRAPH

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Sc Am Sup Nov 14 -91

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Tar furnace, Anderson *Sc Am Sup* * Feb 11-88

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Taylor, John *Inst C E* v 109 -92

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El Eng mod. Am. ap., F. Jones * Mar 30, May 25 * June 22 * July 27 * Aug 3, 17; wire joints, breaking strain in hard drawn cop., Jones, June 1; type, the Am. n * July 27; cable, Burke relay and transmitter * Dec 7-92

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Telegraph

Preece, Sep 18; sub. cables, India-rubber core in * Mar 20; pictorial * Dec 4-**91**; ap. constants, Moon, Apr 29; sub. cables, double differential relay, Raymond-Barker * July 22-**92**

El Rev hist., Vail May 5 *Century* Apr -**88**; cables, broken ocean, Oct 5; multiple, synchronism in, Morse, Nov 16; cable manuf. hist., Barrett, 23-**89**; tournament (fast sending) * Apr 12, 19; curs. in conductors, obs., Bennett * Aug 23; writing, prins. of, Morse * Nov 15-**90**

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El Wld ocean probs. and conditions, Weatherbee * Jan 26; imperfect earth in circuits, phenom., Kenelly * Mar 16; line construct., Paris exhib. * Nov 9-**89**; quadruplex, Healy * Jan 18; submar., Webb (full) Mar 1, (full) *Sc Am Sup* Apr 19; fast sending contest *El Wld* * Apr 19; signaling across rivers, India, Melhuish * May 10; nationalizing, Wiman, Dec 30 -**90**

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El Wld pictorial, Trotter * Jan 16; the Wentz line adjuster, Rosenbaum * Feb 20; lines earth cur. disturbs., Finn * May 14; cable relays, Judd * Nov 5-**92**; multiplex, the phonophore *Eng* * Apr 19; at Paris exhib. * Aug 16, 23 * Oct 11, Post Office, Oct 25, Nov 1-**89**

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Telegraph

F Inst the writing, Gump, Oct -88; cable, Delaney * July, (full) *Sc Am Sup* * Aug 31 * Sep 7-89; foreign curs. balancing effects, Fletcher *Inst C E* * v 94 -88; sub. cables resist. measurement, Rouillard, abs. v 95 -89; sub. Pac. cable, projected *Locom* Nov -91; Gill-Alex. indiv. call *R Gaz* * Mar 13; secret service indiv. call * Aug 28-91

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CHINA, and R's, Hitchcock *E News* * Nov 17-92

DELANY's sys. of private line *El Eng* * July 20-90; aut. *El Wld* * Feb 2; line adjusting *R Gaz* * Nov 1 -89

EUROPE, Gov't. tels. of, Rosewater *El Eng* Dec 9, dis. 16; Niven *Sc Am Sup* * Mar 28-91

MERCADIER multiplex sys., abs. *Inst C E* v 106 -91

PARIS-New York Co. *El Rev Lond* July 29-92

PATTEN's multiplex sys. *El Wld* * Jan 26, (full) * Feb 23, dis. Mar 9-89

POSTAL, Brit. Post Office *El Rev Lond* Apr 5-89; *El Rev* Dec 5, Gov't. control, Rosewater, dis. (full) 12; Great Brit. sys. *The Eng* * Dec 18-91. See also POSTAL telegraph

SPECTRO-tel., Dresing *El Rev Lond*, *El Wld* * July 21 *Sc Am Sup* * Aug 4-88

STENOTELEGRAPH, the Cassagnes (stenography at a distance), Chenut *El Wld* * July 19 *Sc Am Sup* * Aug 16-90

TYPE printing, Wright & Moore's *El Rev Lond* * Mar 1 *Sc Am Sup* * June 8-89 *Iron*

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WEST Indies, competition map *El Rev Lond* * Dec 26-90

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Telegraphophone, the Wheless *El Wld* * Sep 14-89

Telemeter system *El Wld* * Sep 21-89; Fiske's (marine dist. instrum.), Brylinski, abs. *Inst C E* v 106 -91 * *An Telegr* -91; Gautier's pocket (rapid dist. measuring), Robbins *Tech Q* * May -89

Telephone *El Eng* transmitting speech by interrupted elec. curs., Kintner * Jan *El Rev Lond* * Jan 20, 27; and electric light and power circuits, elec. relations, Lockwood *El Eng* Oct -88; interference cases (very full) Mar; induced cur. strength with magneto-teleph. transmitter, Cross, May -89

El Eng induction * Jan; eng., Carty, May 21 *El Rev* May 24; spec. induc. capac., Jacques *El Eng* Oct 1-90; inductive disturbs. in circuits, Carty * Mar 25, dis. Apr 15 *El Rev Lond* Apr 10 *El Rev* * Mar 28, *El Wld* * 28, dis. * Apr 11 *Sc Am Sup* * May 9, expts., Kennelly *El Eng* * May 6, 13-91; signals, selective or indiv., Lockwood * June 8 *El Rev* * June 18 (full) *El Wld* * 11; eng., Webb *El Eng* * Sep 7; connecting stations with exchange office by single line, Zetsche * 21-92

El Rev Lond batteries, Pickernell, Oct 19 *El Rev* Sep 15-88; telephony, Hibbard *El Rev Lond* Oct 18; induction, Carty * Dec 6, dis. *El Rev* * Nov 30 *El Wld* * 30 *Eng* * Dec 20-89; French *El Rev Lond* Jan 10; exchange construct., Pickernell, Oct 17-90; receiver, influence of strength of magnet in, Cross * Feb 20; telephoning great cities, Bennett (full) * Sep 4, 11, 11, ed. Oct 2, 16, Nov 13 *Eng* * Sep 11; and telegraphy, prog. in England, Preece *El Rev Lond* Sep 18-91; domestic telephs. * May 13-27-92

El Rev limits of speaking teleph. lines, Wietlisbach, May 18; Paris exhibit, Sargent, Sep 21, convention, 21; Enzmann's telephonic relay and phonopore * Nov 2-89; principles underlying acoustic telephony, Cross, Feb 8; convention (full) Sep 20; Co's corporate organization, Hall, 20; Root's (box) aut. pay station * Nov 22-90; the McCluer toll-box * Jan 24; telephony, new method of study, Cross, Feb 7; and telegr., inventors of, Gray addr. Apr 18 *El Wld* 25 *E Mag* June 20 *Sc Am Sup* 20; first exchange, New Haven, Ct. *El Rev* Jan 2; ten years with, Barrett * Feb 20-92

El Wld telephony, Touanne, Sep 14-89, duplex, Oct 23-86, Jan 4-90, Barrett * Jan 18; submar. cables for long dist., Preece, Oct 4-90; disturbs., Kennelly, Apr 11-91; U. S. indus. June 18; Co. operating, Foote, July 9-92

E Mag chat with Europe, Webb, Apr -91; indus. future, do. Mar -92; teleph.-equation, Madsen, abs. *Inst C E* v 95 -89; effects, intensity and equality, Mercadier, abs. v 108-92; elec. boxes *Sc Am Sup* * Jan 21; interferences of dynamo curs., McCluer, Oct 13-88; telephone girl, Nelson, Feb 20 -92

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Tech Q magneto transmitter, strength of induced cur., Cross * Feb -89; magneto receiver, influence of strength of magnet, do. * Nov -90; telephony, studies in Rogers lab. of physics, Mass. Inst. Tech., do. *Soc Arts Mass* -89; new method of study in, do. -91

ALBANY, Hudson river Co. *El Rev* * Dec 10-92

AM. Bell Co., report *El Eng* Apr, decis. May -88; reports *El Rev* Apr 7-88, Apr 6-89, Apr 5-90, Apr 11-91, Apr 9-92; U. S. vs., pat. decis., law (full) *El Wld* Mar 24, 31, (full) *El Rev* Mar 31, May 5 *Sci Am* Nov 24; reports, Apr 7-88, Apr 6-89, Apr 11-91

BELL's water-jet transmitter, Tunzelmann *El Wld* * Aug 11 *Sc Am Sup* * Sep 8-88

BERESFORD, the *El Rev Lond* May 27, June 10-92

BOSTON exchange *El Rev* * Aug 1-91

COLLIER audible *El Wld* * July 18-91

DENVER, induction and interference with service *El Eng* Apr 16 -90; system *El Rev* * Feb 9-89

DETROIT Exchange Assoc. *El Eng* Sep 17-90

EDISON's carbon pats. *El Rev* * May 14 *El Wld* * 14-92

GRAMOPHONE, Berliner *El Eng* * Dec 31-90 *El Wld* * Jan 3-91. See also GRAMOPHONE

HOWARD's ap. *El Rev* * Oct 31-91

JACQUE's sys. of simul. telegr. and telephony *El Wld* * Nov 17-88

LONDON-Paris, Eng. Channel submar. line, Preece *El Rev Lond* * Aug 28; Webb *El Rev* Mar 28, Apr 11, Preece * Sep 26 *El Wld* * Oct 3; Eng Mar 20, Preece, Sep 4 *Sc Am Sup* * Oct 3 -91 *El Eng*

LONG distance, 950 miles, Dickson *Cassier's* * Nov; Webb (full) *El Eng* * May 4, 11; N. Y. - Chic. line, eng. details, Wetzler * Dec 14; 1,000 miles by, N. Y. - Chic., pors. *El Rev* * Oct 29; Neilson *El Wld* July 9; *Sc Am Sup* Jan 9-92; *Locom* May -88 *El Rev*

MICROPHONE, evolution of, Tanner *El Wld* * Dec 13 *El Rev Lond* * Nov 21; transmitter, excursion of electrodes, Cross, Oct 31 *Tech Q* Aug *El Rev* Nov 1-90 *Tech Q*; Blake contact expts., Patterson *El Rev* May 5 *Tech Q* Feb -88; Barrett *El Rev* Mar 19-92; transmitter, Berliner pat. (full) *El Wld* * Nov 28, 28-91; cur. strength, Sabine, Cross *Tech Q* Feb -89. See also MICROPHONE

- Telephone**, NAT. Exchange Assoc. pro. *El Eng* Oct (full) *El Rev* Sep 15-**88**; *El Rev Lond* June 7-**89**; (full) *El Wld* Sep 15-**88**, Sep 21-**89**, Sep 20-**90**
- NEW England Teleph. & Telegr. Co. reports *El Rev* May 18-**89**, May 17-**90**; quarters *El Wld* * Aug 1-**91**
- NEW York city, service *El Eng* * Sep 10-**90**; underground wire work *El Rev* * Mar 16-**89**; Met. Exchange * Sep 13-**90**, station *Sci Am* Mar 30-**89**
- PHILA. Bell Co. plant (full) *El Eng* * Feb 10, report, Apr 6-**92**
- PULSION, the *Eng* * Dec 6-**89**
- ROSEBRUGH duplex system *El Wld* * Jan 4-**90**
- SWEDEN & Norway *El Rev Lond* Aug 1 *Eng* Dec 12-**90**
- SUTTON's system *Sc Am Sup* * Feb 28-**91**
- SWITCH-board, Vail & Seely's *El Rev* * July 14-**88**, McClure's multiple * Feb 21-**91**; switching, Wordingham, inset *Inst CE* * v 100-**90**
- UNITED Co., an. meeting *El Rev Lond* July 6-**88**, report, June 7-**89**
- VAN Size's exchange system *El Wld* * Dec 8-**88**
- Tele-photography**, Sutton *El Rev Lond* * Nov 7-**90**
- Telescope** grinding machine, Common's 5-ft. mirror (full) *Eng* * Oct 28 * Nov 4, 11, inset, 18, 25-**92**
- Telescopes**, hand, for stadia work, Richards *Am Min* * v 20-**92** *E & Min* * May 14 *Sc Am Sup* * June 11-**92**; object glasses *Sci Am*, *Eng* * Jan 6; for stellar photog. * Apr 27; astronom., clock driving ap. for, Grubb * Oct 5 *The Eng* Aug 10-**88**; hist., Holden *Sc Am Sup* Jan 21; Manchester exhib. * 28; great, of world, Rees, Mar 3-**88**; pyrometric * Mar 1-**90**; Lick equatorial 36-in., Keeler *The Eng* July 6-**88**
- Telpherage**, two rope haulage systems, Norris *Am M E* * v 12-**91** *E & Min* * Aug 8, 15; aerial wire ropeways, Pohlig, inset (full) *Am Min* * v 19-**91**; cable transfer for R. cars, Spilsbury * v 20-**92**; and elec. R's of Edinb. exhib., Manville *El Rev Lond* Oct 17-**90**
- El Rev* elec. transport., Parcelle * Aug 9; double track elevated elec. wire road, for mining and mills *El Wld* * Jan 4-**90**; Sprague elec. aerial tramway *E & Min* * July 28-**88**; Lidgerwood suspen. cableway, Ogden mines, N. J. * Oct 10-**91**
- E News* the Portelectric carrier, May 25-**89**; Suspen. Transport. Co., Chandler's pat. wire ropeway * July 12-**90**; Plomo-

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sas wire ropeway, McIntire * Mar 21 *Sc Am Sup* * Feb 21 *R Rev* the Garrucha aerial, Spain * July 25 *R & Eng* * Aug *Industries*; suspen. cableway at Austin dam, Tex. *E News* * Nov 14-**91**; long span wire rope, Howland, Me. * Apr 2 -**92**

Inst C E Gourjon system wire ropeways, Gros, abs. v 93 -**88** *An Ponts* * v 14 -**87**; Beer system, Raoult, abs. *Inst C E* v 95 -**89** *Rev Mines* v 3 -**88** *Sc Am Sup* * Dec 15-**88**; Ayrton, Perry, Jenkins', at Glynde, England, Fernald *Pop Sci* * July -**90**; wire rope transport. and transmiss. *R Gaz* * Oct 7-**92**

Sc Am Sup Otto pat. wire ropeway (full) * June 22-**89**, Gottesegeen coll., Silesia, *The Eng* Dec 28-**88**, inset * Jan 25 * Feb 8, 8-**89**; Ry., elec., Edinb. exhib. * July 11 *Sc Am Sup* * Aug 30-**90**; aerial, Landun sugar works, France * June 13-**91**. See also ELEC., Portelec; ROPE driving; WIRE rope

Tempel, William, Schiaparelli *Sc Am Sup* July 13-**89**

Temperatures, at various depths, L. Cochituate, Boston, diag. *E News* * July 26-**90**; absolute zero *R Gaz* Sep 30-**92**. See also EARTH temps; THERMOMETERS

Tennessee and Ala. *Eng* * Oct 5 * Nov 2-**88**

Tesla, Nikola, por. *El Wld* * Feb 15-**90**, and his business *Sc Am Sup* * May 21-**92**

Testing machines, aut. recording ap., Gray *Am M E* v 13 -**92** *Cassier's* * Oct -**92**; the Emery, Towne *Eng* * May 11-25, 75-ton, inset * July 6, dis., insets (full) *Inst M E* * May, Oct, at Watertown arsenal *The Eng* Jan 20-**88**

Eng Kennedy's 50-ton laboratory * Sep 12 *The Eng* * July 18-**90**; hydr., 1200 tons capac., Phoenix I. Co., inset *E News* * Jan 10; the Olsen and com. report *F Inst* * Feb; alternative-center, Walker eng. lab., Liverpool, Hele-Shaw, insets *Inst M E* * July -**91**

Testing materials, uniform methods, com. report *Am C E* v 26-**92**; and sampling works, St. Louis *E & Min* * Feb 11-**88**; standard methods *E News* Mar 7, Aug 22; Kirk system, Hunt, Sept 19-**91**; Malines Gov't. works, Belgium, Roussel *Inst C E* * v 91 -**88**; metals, influence of time in, Bauschinger (full) v 107-**92**; Charlottenburg station, Germany *R & Eng* Aug -**90**; labs., Master Mech's com. report *R Gaz* June 26-**91**; repeated stress, expts., Sondericker *Tech Q* * Apr -**92**. See also BEAMS; CAST iron; MATERIALS, inspection; STEEL, expts.

- Texas**, geological survey *E & Min* Apr 5-90
- Theatre**, Terry, Court and Garrick, structural ironwork in, London *The Eng* * Feb 1-89
- Thermic motor** of the future *Sc Am Sup* * Apr 25-91
- Thermo-dynamics**, difficulty, Mansel cor. *The Eng* Nov 1, n 15-89, Bower cor. * Aug 5, Sep 23 * Dec 2-92
- Thermograph**, Draper's *Eng* * Feb 14-90
- Thermometers**, mercurial, expts. to det. rate of rise or fall, Nagle *Am M E* * v 13 -92; new scale, Forbes *E Wld* Oct 12-89; correcting *Locom* Dec -88, Jan; Browne (full) *Sc Am Sup* * Sep 14-89; calibration method at many points, Holman *Tech Q* * Sep -87
- Thermo-motor**, the Hargreaves *The Eng* Jan 27; and heat engines, R. H. Smith, Feb 3-88
- Thomas**, Edward C. G. *Inst C E* v 99 -90
- Thomas**, Sidney G., bk. review *E & Min* Aug 8-91
- Thompson**, Silvanus P., por. *El Wld* * Jan 9-92
- Thomson**, Elihu, por. (full) *El Wld* * Sep 1-88
- Thomson**, James *Sc Am Sup* July 9-92
- Thomson**, William, por. *El Eng* * Jan 13, por. *El Wld* 16-92, por. (full) *Sc Am Sup* * Mar 9-89
- Thorman**, Edward H. *Inst C E* v 109 -92
- Thrashing** machine trials, Doncaster *The Eng* * June 26, July 3, 10-91
- Thurston**, Robert H., por. *Cassier's* * Nov -91
- Tide** gauge, aut. self-registering, n *E News* * July 28-88
- Tides**, tidal volume, d'Auria *F Inst* * Apr, law of variation * May; range in rivers and estuaries, Gieseler, Aug -91; the bore of the Tsien-tang-Kiang, Moore *Inst C E* * v 99; continuous util. of tidal power, Decoeur, abs. v 102 -90 *Genie Civil* v 17 -90. See also WAVE motors
- Timber**, expan. due to water absorption, De V. Wood *Am M E* * v 10 -89; preservation, ed. *Eng* Nov 21-90; use in eng. structures, Apr 1-92; mine tim. preserv. *E & Min* May 30-91; supply vs. R. consumption, Fernow *E News* Oct 25; preserv., Chanute, Dec 13, report (full) *R Gaz* Dec 12-90 *Sc Am Sup* Feb 14, treatment *The Eng* Sep 11, creosote for, Jan 31; Gov't. tests, J. B. Johnson, Nov 28-91; preserv. *E Rec* Dec 20 -90
- Inst C E* expts., want of uniform system, Campbell, abs. v 92; creosoting in New Zeal., Sharp * v 93 -88; in tropics, the

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teredo Navalis and White ant., James, v 103 -91; pine, strength *R & Eng* Apr -92; preserv., Reed *R Gaz* Sep 19, creosoting (full) Dec 26-90; Am., scientific study of, J. B. Johnson * Dec 4-91; and some of its diseases, Ward (full) *Sc Am Sup* * Mar 17, 24 * Apr 7, 28 * May 5 * June 2 * July 28 * Sep 1, 22, 29-88. See also MATERIALS, strength; WOOD

Time, uniform standard, com. report *Am C E* v 26 -92 *R Gaz* Mar 29-89, Jan 29-92; and cost, short way to keep, Binsse *Am M E* v 9 -88; correct, Pritchett *El Eng* July 2-90; elec. distrib. of, A. D. Brown *El Rev* June 30 *F Inst* June, July, (full) *Sc Am Sup* Aug 18-88; Mayrhofer's system *El Rev* * July 5-90; standard, Gov't. system, Gardner, July 30 *El Wld* July 2-92

E Mag old-fogy methods of reckoning, Fleming * May -91; standard of, 24 o'clock system *E News* * Aug 17-89; correct, simple method of keeping *Locom* Nov -88; standard and 24 hour sys. *R & Eng* May -89, uniform, May -92; convention *R Gaz* Apr 12-89, pro. Apr 11; new notation, Richardson *Sc Am Sup* * Jan 11-90. See also R's, time convention

Time checking machine, the Llewellyn *E News* * Nov 16-89

Tin, assay, influence of Columbite on, Carpenter *Am Min* v 17 -89 (contin. p 785); ores, dry assay, Hofman, v 18 -90 *Tech Q* May, Aug -90; alluvial deposits, Siak, Sumatra, Rolker (full) n p 772 *Am Min* * v 20 -92; tin and the tariff, Fletcher *Bost Traveller* Oct 3-88; produc., ed. *Eng* July 18-90; world's store, Claypole *E Mag* * Jan; tin plate indus. and English exports, n Mar -92 *Industries*

E & Min Dakota mines, Sep 15-88; mines, Malinon * Aug 31; in No. Car., Ledoux cor. Dec 14-89; produc. Aug 30; San Jacinto mines, Cal., Benedict, Oct 18-90; in '89 Jan 4 -90, in '90, Jan 3; in cen. Tex., Comstock, 24; tin plate manuf., Garrison, abs. Feb 28-91 *F Inst* Dec -90; recov. from tin plate scrap, new method, Schultze, abs. *Inst C E* v 102 -90 *E & Min* Mar 28; Bolivia mines, Minchin, May 16; U. S. tin plate indus. Dec 12-91; market, '91, Jan 2; ore concn. plant at Harney Peak, So. Dak. * July 30, mines do. Nov 26, Dec 3-92

E News Am. mines, Emmens, Nov 24-92; produc. *Sc Am Sup* Aug 9-90; sources of, Merrill, Nov 28; hist. of discov. and use of, Flower, Dec 5-91

Tin plate cleaning machine, Davies' *E & Min* * June 27-91

- Tires**, Munton proc. manuf. steel, Chic., inset *Eng* * Oct 17-**90**
- Tobacco**, use of, anal. (effect) Bosworth *Sc Am Sup* Apr 27-**89** ; (effects) Rochard, Sep 10-**92** *Pop Sci*
- Tools**, cast iron, for cutting metals, O. Smith *Am Min* * v 19-**91**
- Torey**, Hamilton *Inst C E* v 98-**89**
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- Torpedo** boats, the Halpine *El Rev* * Oct 19; Sims-Edison fish * Nov 16; Peral submarine, Webb *El Wld* Oct 19-**89** ; Fatum, Italian, inset *Eng* * Jan 20 *Sc Am Sup* * Feb 25; 2d class, Yarrow *Eng* * Apr 27-**88** ; Donaldson, Feb 22; Spanish trials report, Mar 29, Apr 12, 19; seaworthiness of, Hovgaard, July 26; Ital. navy * Dec 6; Brit. navy * 20-**89** ; Sunderland, b. with petrol. fuel, indic. diags. inset, * Jan 10, Mansel cor. 24, (full) *Sc Am Sup* * Feb 22; Yarrow's, Dec 20 *Eng* * Nov 21-**90** ; Brazilian navy, sea-going * Sep 18-**91**
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- Torpedo** placing machine, the Fox *R & Eng* * Feb -**92**
- Torpedo** thrower, aerial, Graydon air gun *Sc Am Sup* * Dec 15-**88**
- Towers**, Egyptian, light, Minneap. exhib. *El Eng* * Sep 17-**90** ; Judson, 1600 ft. *Eng* * Nov 15-**89** ; London, great, proposed, ed. May 2-**90** ; iron, Frankfort Elec. exhib. * Aug 21; U.S. Columb., Chic., Morison's 1120 ft. * Nov 20 * Dec 18 *E News* * Dec 5-**91** *R & Eng* * Jan -**92** *R Gaz* * Dec 4-**91**

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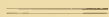
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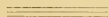
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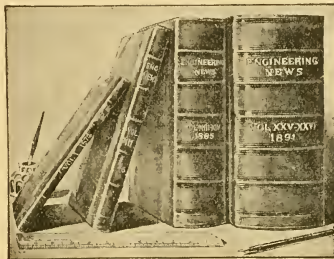
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